FLORA

OF THE

PRESIDENCY OF MADRAS

J. S. GAMBLE

PART X

GRAMINEAE

BY

C. E. C. FISCHER

PUBLISHED UNDER THE AUTHORITY OF THE
SECRETARY OF STATE FOR INDIA IN COUNCIL

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FLORA

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J. S. GAMBLE

PART X

GRAMINEAE

BY

C. E. C. FISCHER
LATE OF THE INDIAN FOREST DEPARTMENT

COMPLIMENTARY

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London

The Supplementary Note, explanatory of Part IX, appeared as No. VII in the 'Kew Bulletin' for 1931, p. 257.

CECIL E. C. FISCHER.

ROYAL BOTANIC GARDENS, KEW;
21st November, 1934.

Made and printed in Great Britain

FLORA OF MADRAS.

Family CLXXVI. GRAMINEAE.

Erect, decumbent or creeping, sometimes floating herbs, or tall reeds, shrubs or trees or climbers; annual or perennial by means of rhizomes. Stems simple or more commonly branched from the base, generally terete and hollow between the nodes. *Leaves* alternate, commonly 2-ranked, nearly always with a sheathing base split down one side; ligule at the junction of the blade (or petiole) and the sheath consisting of a membrane or a fringe of hairs, rarely absent; blades usually long and narrow, rarely ovate, parallel-nerved, sessile or sometimes petioled. *Inflorescence* terminal, rarely terminal and lateral, composed of panicled, racemose, simply or compoundly spicate, or capitate spikelets, rarely reduced to a single spikelet; rarely dioecious. *Flowers* solitary or 2–many aggregated in a spikelet. *Spikelets* homogeneous or differing in sex and shape; 1-sexual or 2-sexual with all the florets 2-sexual or 2-sexual with ♂ only or ♀ and ♂ in the same spikelet. The two, seldom more, lowest bracts of the spikelet (*glumes*), one sometimes absent, empty, the rest (*lemmas*) containing a naked floret or sometimes empty by reduction, usually with a smaller bract (*palea*) between the floret and the axis. Usually there are 2, rarely 3–several, hyaline, usually minute scales (*lodicules*) within the palea, representing the reduced perianth. *Stamens* 3, rarely 6, 4, 2 or 1, very rarely more than 6; filaments slender, often very long, free, rarely united; anthers versatile with 2 parallel cells. *Ovary* entire, 1-celled; styles 2, rarely 3 or 1, free or connate at the base, usually clothed above with simple or branched stigmatic hairs; ovule solitary, erect, anatropous. *Fruit* a grain, free within the lemma and palea or adnate to either or both. *Seed* erect, albumen copious, floury: embryo minute or large, at the base of and outside the albumen. Mature spikelets falling entire from the tips of their pedicels or together with the pedicel or a part of it or with a part of the rhachis, or else breaking up above the glumes into separate false fruits, rarely persistent and shedding the grain.

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The genera are those adopted by Stapf in the 'Flora of Tropical Africa' wherever possible, and the key to the genera is based on that in the same work. For the necessary modifications much assistance was derived from Haines's 'Botany of Bihar and Orissa,' Cooke's 'Flora of the Bombay Presidency,' together with Blatter and McCann's revision thereof, and Melle. A. Camus's key in 'Flore générale de l'Indo-Chine.'

Mr. C. E. Hubbard, of Kew, has given much help and advice, but he is in no way responsible for the ultimate result.

The measurements given for culms exclude the inflorescence; those of the leaves refer to the blades only, and those of the glumes and lemmas exclude cusps, aristas or awns if present, unless otherwise stated.

Sexes in different inflorescences or if in the same then ♀ few at the base and ♂ above :—
- Monoecious ; leaves flat, not spiny : ♂ panicled or spicate :—
  - Sexes in separate inflorescences ; ♂ in large panicles, ♀ spikes in an axillary sheath, fused together to form a spongy body . . 1. **Zea.**
  - Sexes in the same inflorescence ; ♂ in several pairs, ♀ solitary or few :—
    - ♀ solitary within a closed, globose, stony bract . . . . . . 2. **Coix.**
    - ♀ 1–several, each embraced by the oblong, dorsally compressed, coriaceous lower glume which is open ventrally . . 3. **Chionachne.**
- Dioecious ; leaves involute, rigid, spiny ; inflorescence in globose heads . . . . 4. **Spinifex.**

Sexes mixed :—
- Mature spikelets falling entire from or with their pedicels or with the contiguous joint of the rhachis, all alike or differing in sex and structure, perfect ones with 2 heteromorphous florets, lower ♂ or empty, upper bisexual :— (5–67)
  - Spikelets usually in pairs, one sessile, the other, rarely both, pedicelled, rarely 3-nate or solitary on the axes of variously arranged, often spiciform racemes; glumes firmer than the lemmas; lemmas membranous, often hyaline, the upper sometimes awned or reduced to an awn :— (5–44)
    - Joints and pedicels not bulbous, not adnate to one another, if thick then the spikes digitate or in spathaceous panicles :— (5–38)
      - All spikelets alike in shape and sex or if dissimilar then paleas very short or absent :—
        - Spikes in compound panicles or racemose on an elongate common axis ; spikelets 1-flowered :—

Rhachis tough; all spikelets pedicelled :—
Panicle thyrsoid; callus long-silky-hairy; spikelets 2-nate, one long-, one short-pedicelled :—
Panicle narrow-thyrsiform, silvery hairy; lemmas awnless ....5. **Imperata.**
Panicle broadly fan-shaped, brownish-hairy; lemmas usually awned ....6. **Miscanthus.**
Panicle narrow: spikelets solitary; glumes shortly brown-hairy ....7. **Cleistachne.**
Rhachis readily disarticulating; spikelets 2-nate, one sessile, the other pedicelled :—
Spikelets awnless. Leaves not narrowed to the base, not petioled :—
Glumes membranous or chartaceous at the base only. Panicles wide, more or less silvery-plumose 8. **Saccharum.**
Glumes chartaceous or coriaceous throughout. Panicles narrow, rufous-hairy, not plumose 9. **Eriochrysis.**
Spikelets awned. Leaves narrowed at the base, often long petioled ....10. **Spodiopogon.**
Spikes digitate or solitary; spikelets 1-flowered, or if 2-flowered then the lower glumes channelled :—
Rhachis inarticulate; spikelets not paired 11. **Dimeria.**
Rhachis articulate :—
Spikes solitary, capillary; spikelets 2-awned 12. **Pogonatherum.**
Spikes digitate; spikelets 1–2-awned :—
Rhachis fragile; pairs of spikelets always one sessile and one pedicelled; glumes ·1 in. or more long; upper lemma much wider than its awn 13. **Eulalia.**
Rhachis more or less persistent; pairs of spikelets often both pedicelled; glumes less than ·1 in. long; upper glume hardly wider than its awn :—
Lower glume flat or depressed on the back, not channelled ....14. **Pseudopogonatherum.**
Lower glume deeply channelled on the back 15. **Microstegium.**
Sessile and pedicelled spikelets dissimilar, sessile bisexual, pedicelled ♂, empty or 0, or if similar (*Pollinidium*) then the paleas well-developed and the rhachis compressed :—

Fertile spikelets 2-flowered :—
Pedicelled spikelets present :—
Both spikelets awned ; joints of rhachis and pedicels flattened or thickened ; paleas well developed :—
Rootstock and base of culm clothed with woolly sheaths ; rhachis flattened ; spikelets all similar and homogamous .... 16. **Pollinidium.**
Culm not woolly at base ; joints and pedicels stout ; spikelets heterogamous :—
Spikes clustered or digitate ; lower glumes not channelled .... 17. **Ischaemum.**
Spikes solitary ; lower glumes channelled on the back .... 18. **Sehima.**
Sessile spikelet awnless ; lower glumes 3-toothed
19. **Lophopogon.**
Pedicelled spikelets suppressed, pedicels only present :—
Spikes usually 2 ; margins of glumes smooth
20. **Apocopis.**
Spikes solitary ; margins of lower glumes spinulose- or bristle-pectinate................ 21. **Eremochloa.**
Fertile spikelets 1-flowered :—
Panicles not subtended by spathes :—
All pairs of spikelets alike :—
Upper lemma awned from the back below the middle ; spikes digitate .... 22. **Arthraxon.**
Upper lemma awned from the tip or the sinus :—
Upper lemma reduced to the hyaline stipitiform base of the awn ; joints and pedicels filiform with a translucent longitudinal depression :—
Racemes in compound panicles
23. **Capillipedium.**
Racemes subdigitate, fascicled or verticillate on an elongate axis .... 24. **Amphilophis.**
Upper lemma not reduced, 2-fid, awned from the sinus ; joints and pedicels solid :—
Raceme of many pairs of spikelets :—
Primary branches of the panicle whorled : lower glumes coriaceous, muricate or tuberculate .... 25. **Vetiveria.**
Primary branches not whorled ; lower glumes chartaceous, smooth
26. **Pseudosorghum.**

Raceme of few pairs of spikelets, rarely 6, sometimes reduced to 1 sessile and 2 pedicelled :—

Spikelets dorsally compressed; pedicelled spikelet sometimes reduced to a pedicel only; sessile spikelet awned or not. . 27. **Sorghum.**

Spikelets laterally compressed, raceme nearly always reduced to 1 sessile and 2 pedicelled spikelets on the tips of slender peduncles, all awned . . . . 28. **Chrysopogon.**

Lowest 1 or more pairs of spikelets homogeneous and *differing from all above them* :—

Spikes digitate, rarely solitary; sessile spikelets dorsally compressed; callus of lemma short 29. **Dichanthium.**

Spike solitary; sessile spikelets subcylindric; callus elongate, pungent . . . . 30. **Heteropogon.**

Panicles subtended by spathes; spikes usually 2, or 1, rarely more, on a common peduncle sheathed by a spatheole :—

Spikes reduced to 1 or a few nodes with or without a surrounding involucre of modified ♂ or empty spikelets :—

Involucre of modified spikelets present :—

Involucral spikelets persistent, the rest jointed on the rhachis and falling separately. 31. **Themedia.**

Involucral spikelets jointed on the peduncle and falling together with the rest . . . . . . 32. **Iseilema.**

No involucre present :—

Callus of spikelet not inflated 33. **Pseudanthistiria.**

Callus much inflated . . . . 34. **Apluda.**

Spikes many-noded, not reduced nor involucred :—

Spikes solitary in each spatheole :—

Joints and pedicels slender . . . . 35. **Eremopogon.**

Joints and pedicels thickened upwards to a cupped apex, often with a dentate terminal appendage . . . . 36. **Schizachyrium.**

Spikes twin in each spatheole :—

All pairs of spikelets similar; racemes terminating the culms . . . . 37. **Andropogon.**

Lowest pair of spikelets of one or both spikes homogeneous; lowest joint sometimes much thickened; plant often aromatic; panicles decompound ....38. **Cymbopogon.**

Joints of the rhachis and often the pedicels much swollen, sometimes joint and pedicel fused to form a cylindric axis in which the lower glume is sunk; pedicelled spikelet sometimes suppressed :—

Sessile and pedicelled spikelets very unlike, sessile, globose 39. **Hackelochloa.**

Spikelets more or less alike and compressed or the pedicelled suppressed :—

Spike readily disarticulating :—

Lower glumes convex; pedicelled spikelets suppressed; pedicels fused with the joints ....40. **Ophiuros.**

Lower glumes flat; ends of joints hollowed out :—

Pedicelled spikelets as large as or only slightly smaller then the sessile :—

Raceme terete; lower glumes of sessile spikelets not or very narrowly winged, awnless 41. **Rottboellia.**

Raceme compressed; lower glume of sessile spikelets broadly winged or if only winged in upper half then 1–2-awned ....42. **Manisuris.**

Pedicelled spikelets rudimentary; sessile spikelets deeply sunk in opposite cavities ......43. **Mnesithea.**

Spike with cohering joints with truncate tips, compressed 44. **Hemarthria.**

Spikelets in usually continuous spikes, racemes or panicles; glumes herbaceous or membranous, the lower generally smaller, sometimes minute or absent; lower lemma generally resembling the upper glume, the upper always fertile, ultimately rigid, chartaceous or crustaceous, muticous, mucronate or awned :—

Upper floret only fertile; lower lemma not hardened :—(45–66)

Inflorescence of usually slender, spiciform, digitate, sub-digitate or distant, very rarely solitary racemes; fruiting lemma usually with flat thin margins with the usually minute lower palea attached to its base :—

Spikelets muticous; lower lemmas with 5–7 close, prominent nerves ....45. **Digitaria.**

Spikelets awned or aristate; lower lemma smooth 46. **Alloteropsis.**

Inflorescence usually different, various ; fruiting lemma with more or less inrolled margins ; lower palea not attached to the upper lemma :—

Spikelets falling entire and singly from the persistent pedicels, rarely falling with the contiguous joints of an articulate rhachis (51. *Stenotaphrum*) :— (47–64)

Spikelets muticous, or if awned then subsessile in false secund spikes with the awns from the entire or the very slightly notched tips of the upper glumes and the lower lemmas, or the tips of the lower or both glumes ; fruiting lemmas crustaceous :— (47–63)

Inflorescence never an open or contracted-cylindric panicle :—

Back of fruit turned away from the axis :—

Spikelets strongly laterally compressed ; lower glume herbaceous, as long as the spikelet 47. **Pseudechinolaena.**

Spikelets more or less dorsally compressed : lower glume never herbaceous :—

Bases of spikelets with a swollen annular callus formed by the rudimentary lower glume and the base of the rhachilla ....48. **Eriochloa.**

Bases of spikelets devoid of swollen callus, lower glume distinct ....49. **Brachiaria.**

Back of fruit turned towards the axis :—

Lower glume absent or reduced to a scale ; spikelets usually conspicuously plano-convex with the flat side turned away from the rhachis 50. **Paspalum.**

Lower glume well developed :—

Rhachis flat, articulated ; spikelets in cavities of the rhachis, ultimately falling with the contiguous joint ....51. **Stenotaphrum.**

Rhachis not articulated ; spikelets falling from their pedicels :—

Glumes muticous :—

Fruiting lemmas acute, not mucronate ; spikelets solitary, their sides contiguous 52. **Paspalidium.**

Fruiting lemmas obtuse, abruptly mucronate ; spikelets paired or if solitary then their backs contiguous .... 53. **Urochloa.**

Glumes, at least the upper, caudate or awned :—

Leaves linear; glumes entire, the lower awnless ....54. **Echinochloa.**

Leaves lanceolate; glumes slightly notched, the lower awned ....55. **Oplismenus.**

Inflorescence an open or a contracted, cylindric spiciform panicle :—

Spikelets not supported by bristle-like branchlets, rarely replaced by a minute bristle (57. *Holcolemma*) :—

Spikelets not gibbous, or if slightly so then not in cylindric, spiciform racemes :—

Panicles open, or if contracted the branches spreading, not spiciform :—

Glumes similar, subequal, shorter than the spikelet :—

Rhachis branched, branches long; base of rather broad leaves rounded; glumes lanceolate, acuminate, prominently nerved; fruiting lemmas smooth ..56. **Ottochloa.**

Rhachis simple; base of very narrow leaves narrowed; glumes broadly ovate, subacute, not prominently nerved; fruiting lemmas finely transversely rugulose 57. **Holcolemma.**

Glumes dissimilar, the lower much the shorter, rarely absent ....58. **Panicum.**

Panicles contracted, dense, branches appressed spiciform ....59. **Hymenachne.**

Spikelets distinctly gibbous and oblique, or if only slightly so then in cylindric, spiciform racemes :—

Spikelets laterally much compressed 60. **Cyrtococcum.**

Spikelets turgid, not compressed 61. **Saccolepis.**

Spikelets, at least the upper of each branch, supported by bristle-like branchlets :—

Terrestrial, erect; panicle contracted, usually spiciform; bristles many, not produced beyond the terminal spikelet...............62. **Setaria.**

Aquatic, decumbent; panicle open; bristle solitary, much produced beyond the terminal spikelet ....63. **Pseudoraphis.**

Spikelets finely awned or mucronate from the sinus of the distinctly notched upper glumes and lower lemmas, the latter rarely muticous, delicately pedicelled. panicled; lower glume minute; fruiting lemma rigidly membranous ....64. **Rhynchelytrum.**

Spikelets involucrate with spines or bristles, falling in groups, seldom singly :—

Involucre of free, naked or feathery bristles 65. **Pennisetum.**

Involucre of spines or rigid bristles united into a hard cup ....66. **Cenchrus.**

Both florets fertile, or if the lower ♂ then its lemma hardened and more or less resembling the upper ....67. **Isachne.**

Mature spikelets breaking up, leaving the persistent or subpersistent glumes on the rhachis or pedicels, or if falling entire then not consisting of 2 heteromorphous florets :—

Blades of leaves not transversely veined or articulate on the sheaths, or if so (112. *Lophatherum*, 113. *Centotheca*) not large woody shrubs or trees :— (68–126)

Awn of fertile floret if present kneed and twisted below the knee (rarely straight in reduced forms) :— (68–85)

Spikelets 2–several-flowered :—

Florets 2 only, dissimilar: lower lemma awnless; awn of upper lemma, when present, from the entire tip :—

Tall reeds; leaves distichous; panicles large, decompound; spikelets very small, jointed on the pedicels; upper lemma awnless ....68. **Thysanolaena.**

Small or moderate-sized plants; leaves not distichous; panicles small, not decompound; spikelets not jointed on the pedicels; upper lemma usually awned, sometimes also with 2 setae ....69. **Arundinella.**

Florets 2–several, all alike or the uppermost reduced; lemmas membranous, often with hyaline margins; awn, when present, from the back or the sinus or from between bristles :—

Small or moderate-sized plants: panicles not decompound: rhachilla rarely jointed between the lemmas :—

Florets 2–several; lemmas 2-cleft, usually awned from the back below the sinus :—

Perennials; spikelets moderate-sized, erect or suberect; glumes usually 1–3-nerved..70. **Avenastrum.**

Annuals; spikelets large, pendulous; glumes 7–9-nerved..........................71. **Avena.**

Florets 2 only; lemmas entire :—

Weak marsh plants; glumes not keeled; rhachilla elongate between the lemmas; upper lemma the longer, coriaceous ....72. **Coelachne.**

Rigid, erect, terrestrial plants; glumes keeled; rhachilla short between the equal, chartaceous lemmas............................73. **Zenkeria.**

Very tall reeds; panicles decompound; rhachilla jointed between the lemmas :—

Lemmas silky-hairy; rhachilla elongate, glabrous or short-hairy at the base :—

Lemmas hairy all over the back below the middle 74. **Arundo.**

Lemmas hairy from the nerves on the sides only 75. **Neyraudia.**

Lemmas glabrous; rhachilla short, long-hairy 76. **Phragmites.**

Spikelets 1-flowered :—

Inflorescence panicled :—

Panicles dense, oblong-spiciform or lobulate 77. **Polypogon.**

Panicles effuse or narrow, not dense or spiciform :—

Lemma cylindric, coriaceous, tightly enfolding the grain, awned, awns often 3 ....78. **Aristida.**

Lemma lanceolate, membranous or cartilaginous, not enfolding the grain :—

Spikelets not jointed on the pedicels; awn, when present, from the back of the lemma..79. **Agrostis.**

Spikelets jointed on the pedicels; usually awned from the tip of the lemma ....80. **Garnotia.**

Inflorescence spicate or racemose :—

Racemes 2–3, seldom solitary; rhachis broad, flat, disarticulating; spikelets mixed with rigid flowerless glumes...............................81. **Trachys.**

Racemes solitary; rhachis narrow, not flat, not articulated; flowerless glumes absent :—

Upper glume 5-ribbed, armed with hooked spinules 82. **Tragus.**

Glumes neither ribbed nor spinulose :—
Rhachis straight ; spikelets spreading :—
Spikelets minute, shaped like a shoe or a bird's head, awnless ....83. **Lopholepis.**
Spikelets larger, narrowly lanceolate ; glumes tapering into a long fine awn ......84. **Perotis.**
Rhachis flexuous, forming recesses into which the spikelets are appressed ....85. **Zoysia.**
Awn of the fertile floret, when present, never kneed :—
Lemmas typically 3-nerved :—
Inflorescence panicled, or if spicate (some *Eragrostis*) then not secund :—
Spikelets 1-flowered, very small ; glumes and lemmas very similar, awned ....86. **Sporobolus.**
Spikelets 2–many-flowered, or if only 1-flowered then glumes and lemmas dissimilar :—
Lemmas entire :—
Glumes rigid, coriaceous, awned 87. **Myriostachya.**
Glumes membranous or cartilaginous, not awned, at most caudate-acuminate :—
Upper glumes 1-nerved :—
Spikes short, straight, crowded ; spikelets closely packed ....88. **Desmostachya.**
Spikes slender, long, flexuous ; spikelets distant......................89. **Leptochloa.**
Upper glumes 3–5-nerved :—
Lower glume 1-nerved, upper 3-nerved ; lemmas moderately rigid ; rhachilla glabrous 90. **Eragrostis.**
Lower glume 3-nerved, upper 5-nerved ; lemmas coriaceous ; rhachilla joints bearded 91. **Halopyrum.**
Lemmas emarginate :—
Spikelets laterally compressed, sessile or subsessile, few–many-flowered ; rhachilla not produced beyond the lemmas ....92. **Diplachne.**
Spikelets terete, pedicelled, 1-flowered ; rhachilla produced beyond the lemma into a filiform arista 93. **Dichaetaria.**
Inflorescence of sessile or subsessile spikelets in 2-ranked, secund, usually dense, solitary, digitate or racemosely arranged spikes :—

Spike solitary, rarely twin :—
Spikelets more or less sunk in the rhachis
94. **Oropetium.**
Spikelets not sunk in the rhachis :—
Spikelets awnless ....95. **Microchloa.**
Spikelets awned :—
Spikelets 1–2-flowered in pedicelled, articulate clusters; *rhachilla produced beyond the upper* lemma ....96. **Melanocenchris.**
Spikelets 1–many-flowered, sessile, not in clusters :—
Spikelets 3–many-flowered; lower glume usually lodged in a furrow in the rhachis; rhachilla not produced beyond the terminal lemma ....97. **Tripogon.**
Spikelets 1–3-flowered; lower glume not lodged in the rhachis; rhachilla produced beyond the uppermost lemma..........98. **Enteropogon.**
Spikes digitate, umbelled or racemose, very rarely solitary or if so then lemmas obovate :—
Spikelets 1-flowered; spikes always digitate
99. **Cynodon.**
Spikelets 2–several-flowered, sometimes only 1–2 fertile :—
Fertile florets 1–3 with 1 or more imperfect above or below; spikes umbelled or racemose, rarely solitary; lemmas awned or aristate ..100. **Chloris.**
Fertile florets 2–several, none imperfect :—
Spikes digitate or subdigitate or capitate, usually rigid; glumes shorter than lemmas :—
Spikes terminated by a spikelet; glumes and lemmas muticous or obscurely mucronate
101. **Eleusine.**
Spikes terminating in a sharp point; upper glume and lemmas rigidly mucronate or cuspidate ....102. **Dactyloctenium.**
Spikes racemose, slender, spreading or deflexed; glumes much longer than the lemmas
[103. **Dinebra.**
Lemmas typically 5–many-nerved :—
Lemmas broad, 4–9-lobed :—
Inflorescence a contracted panicle; lemmas 9-nerved and -awned ....104. **Enneapogon.**

Inflorescence a simple spike; lemmas spirally arranged in a cone, 4-nerved, and lobed, 1–5-awned
105. **Pommereuilla.**

Lemmas entire or 2-, rarely 3-lobed:—

Spikelets in compact, subcapitate or cylindric, often interrupted, spikes:—

Leaves flat, neither distichous nor pungent, usually long; spikes cylindric, often interrupted
106. **Elytrophorus.**

Leaves convolute, distichous, rigid, pungent, 1–2 in. long; spikes capitate ....107. **Aeluropus.**

Spikelets not compact, in spikes, racemes or panicles:—

Inflorescence panicled:—

Glumes absent, or minute or setaceous; fertile floret solitary:—

Lower florets represented by 2 scales or bristles; glumes minute, scale-like or subulate
108. **Oryza.**

Lower florets suppressed: glumes 0 or reduced to a rim:—

Glumes represented by an entire or 2-lobed rim; lemmas awnless ....109. **Leersia.**

Glumes suppressed; lemmas awned
110. **Hygrorhiza.**

Glumes, at least the upper, developed:—

Two lower lemmas 2-lobed, awned from below the sinus ....111. **Anthoxanthum.**

Lemmas entire:—

Leaves flat, lanceolate, with numerous transverse venules:—

Spikelets not compressed; fertile floret 1, with several closely sheathing, cuspidate empty lemmas above....112. **Lophatherum.**

Spikelets compressed; fertile florets 1–3, empty lemmas 0–1–several, usually with erect or deflexed bulbous-based bristles: muticous ....113. **Centotheca.**

Leaves usually narrow, no transverse venules:—

Lower 1–3 lemmas bisexual, those above empty, enfolding each other to form a clavate or oblong terminal body
114. **Melica.**

Upper lemmas not in a terminal sterile body :—
Glumes and lemmas muticous ; spikelets laterally compressed :—
Panicles expanded ; glumes and lemmas subequal :—
Spikelets ovate or triangular ; pedicels capillary ; glumes and lemmas broadly ovate, obtuse, not keeled
115. **Briza.**
Spikelets oblong ; pedicels not capillary ; glumes and lemmas ovate-lanceolate, acute, keeled ...116. **Poa.**
Panicles narrow ; spikelets elongate-oblong ; glumes much shorter than the strongly nerved lemmas ..117. **Glyceria.**
Glumes and lemmas caudate, aristate or awned :—
Panicles contracted ; spikelets in dense clusters ; rhachilla short between the lemmas ....118. **Dactylis.**
Panicles more or less expanded ; spikelets not clustered ; rhachilla elongate between the lemmas :—
Lower glume much the shorter ; lemmas subulate, not keeled
119. **Vulpia.**
Glumes subequal ; lemmas oblong or lanceolate :—
Lemmas rounded on the back or keeled only in the upper half, ·25 in. or less long....120. **Festuca.**
Lemmas sharply keeled throughout, ·28 in. or more long..121. **Bromus.**
Inflorescence a simple spike or raceme :—
Leaves narrowed into a petiole ; lemmas convolute, acutely 2-fid...................122. **Streptogyne.**
Leaves not petioled ; lemmas entire :—
Spikelets distant on the rhachis :—
Rhachis straight, not recessed ; spikelets nearly terete, not distichous
123. **Brachypodium.**

Rhachis flexuous, recessed; spikelets much compressed, distichous ....124. **Lolium.**
Spikelets aggregated into a dense oblong head :—
Spikelets solitary at the nodes, without involucral outer glumes......125. **Triticum.**
Spikelets 3-nate at the nodes; outer glumes of each cluster together forming a quasi involucre..................126. **Hordeum.**
Blades of leaves usually transversely veined, articulate on their sheaths; large woody shrubs or trees with large culm-sheaths with an imperfect blade :—Bamboos.
Paleas differing from the lemmas, 2-keeled, or if not keeled then the stamens monadelphous :—
Staminal filaments free :—
Stamens 3 ....127. **Arundinaria.**
Stamens 6 :—
Spikelets in globose congested heads
128. **Dendrocalamus.**
Spikelets not in globose congested heads :—
Imperfect blade of culm-sheath broadly triangular, erect; paleas 5–7-nerved between the keels; pericarp thin, adnate to the seed ....129. **Bambusa.**
Imperfect blade linear-ensiform, recurved; paleas 1-nerved between the keels; pericarp crustaceous, free from the seed ....130. **Teinostachyum.**
Staminal filaments united into a tube; stamens 6
131. **Oxytenanthera.**
Paleas 0 or resembling the lemmas, not keeled; stamens usually numerous; filaments free or united ....132. **Ochlandra.**

1. **Zea**, Linn.

Tall, stout, annual herbs. *Leaves* large, flat. *Inflorescence* monoecious; ♂ spikelets in large terminal subdigitate or racemose panicles of spiciform racemes; axes of ♀ spikes fused into a spongy, subcylindric core in axillary sheaths. ♂ *spikelets* 2-nate, one pedicelled, the other sessile, 2-flowered. *Glumes* subequal, membranous. *Lemmas* similar, hyaline, their paleas similar. *Lodicules* 2, fleshy. *Stamens* 3. ♀ *spikelets* 2-nate in 4–11 longitudinal rows, slightly immersed in the axis; florets 2, the lower reduced to an empty lemma. *Glumes* similar, very broad, fleshy below,

hyaline above. *Lemmas* like the glumes; paleas short, broad, the lower sometimes wanting. *Lodicules* 0. *Styles* long, 2-fid at the tip, exserted in long silky tassels from the sheathing bracts. *Grain* subglobose, surrounded by the dried-up glumes, lemmas and paleas.

ZEA MAYS, Linn.; F. B. I. vii. 102.

A S. American plant cultivated in many localities for its edible grain and its fodder leaves. Maize or Indian Corn.

Stems robust, up to 10 ft. or more high; leaves up to 3 ft. long and 4 in. wide; ♂ spikelets ·25–·35 in. long; styles several inches long. Vern. *Ur.* Mokka; *Tel.* Mokka jounalu; *Tam.* Makka cholam, Turaka cholam; *Mal.* Makka cholam; *Kan.* Makkai jola.

2. Coix, Linn.

Annual or perennial, tall, erect or floating plants. *Leaves* flat. *Inflorescence* of fascicled axillary and terminal spiciform racemes, consisting usually of one ♀ spikelet completely enclosed in a globose or ovoid basal bract through which the rhachis grows out and bears the ♂ spikelets above. *Bract* eventually stony and polished, sometimes continued into a leafy blade, rarely a second bract above. ♂ *spikelets* imbricate in pairs or threes, one of them pedicelled. *Glumes* subequal, herbaceous, the lower flat with 2 lateral winged keels, the upper boat-shaped with a median keel. *Florets* 2, both staminate or the upper empty. *Lemmas* similar, membranous, the upper shorter; paleas hyaline. *Lodicules* 2, cuneate, fleshy. *Stamens* 3. ♀ *spikelets* enclosed in the bract with 2 bare pedicels. *Glumes* hyaline-membranous and inflated below, contracted into an acute cartilaginous beak, the upper acutely keeled between 2 deep grooves. *Florets* 2, the lower usually reduced to an empty lemma resembling the lower glume, *upper lemma* resembling the upper glume, with a broad palea. *Lodicules* 0. *Stamens* 3, rudimentary. *Style* long, deeply 2-fid, exserted from the mouth of the sheathing bract. *Grain* subglobose or ellipsoid, enclosed in the bract; embryo as long.

Annual: culms up to 5 ft. high; leaves linear-lanceolate, 5–18 in. long, ·5–2 in. wide, base cordate, rarely narrowed; peduncles up to 3 in. long; ♀ bract ·3–·5 in. long; ♂ racemes ·4–2 in. long; spikelets 2–3-nate; wings of lower glume ·03–·07 in. wide ..1. *Lacryma-Jobi.*

Perennial; culms up to 15 ft. high; leaves linear, 1–4 ft. long, ·1–·7 in. wide, base narrowed or slightly rounded, not cordate; peduncles up to 7 in. long; ♂ racemes ·7–2·5 in. long; spikelets usually 3-nate; wings of lower glume ·02–·05 in. wide .... 2. *gigantea.*

1. COIX LACRYMA-JOBI, Linn.; F. B. I. vii. 100; S. I. G. fig. 126.

   In all Districts except the hottest and driest localities; from near sea-level to 7,000 ft. Job's tears.

   Sometimes cultivated by hill tribes for the grain. The stony bracts are strung by the hillmen into necklaces and other ornaments. The leaves are readily eaten by cattle. Vern. *Hind.* Sankru; *Tam.* Kattu-kundamani.

2. COIX GIGANTEA, Roxb. *C. Lachryma-Jobi,* Linn. var. *gigantea,* Stapf; F. B. I. vii. 100.

   In the same localities as the last species.

3. Chionachne, R. Br.

Annual or perennial erect herbs. *Leaves* flat, narrow. *Inflorescence* of spiciform racemes; racemes entirely ♂ or with 1 or more ♀ spikelets at the base, at first enclosed in spathiform bracts; rhachis articulate at the base and above each ♀ spikelet. ♂ *spikelet* 2-flowered, solitary or 2-nate and then one pedicelled. *Glumes* dissimilar, lower herbaceous, shallowly concave with a narrow membranous wing on each side, upper chartaceous or rarely herbaceous, narrower. *Lemmas* similar, membranous, paleate, both staminate or the upper empty. *Lodicules* 2, cuneate. *Stamens* 3. ♀ *spikelets* oblong, dorsally compressed, 2-flowered. *Glumes* very dissimilar; lower thickly coriaceous, embracing but not concealing the rhachis between its inflexed margins, enclosing the upper glume and floret; upper membranous or chartaceous. *Lemmas* delicately hyaline; the lower empty, paleate or not; the upper narrow, its palea wrapped round the pistil. *Lodicules* 0. *Styles* very long. *Grain* orbicular, compressed, ventrally channelled, free inside the hardened lower glume.

Culms up to 2 ft. high; leaves up to 12 in. long, ·1–·25 in. wide; spathes always closed, 1–1·5 in. long, muticous or mucronate; racemes solitary: ♀ spikelets 2–5, ·27–·34 in. long; ♂ spikelets usually many; wings of lower glume glabrous, not ciliate .... 1. *semiteres.*

Culms up to 8 ft. high; leaves up to 3 ft. long, ·22–·65 in. wide; spathes chaffy, at first plicate, soon opening out, ·5–1 in. long with an arista ·2–·5 in. long; racemes umbelled; ♀ spikelets solitary, ·19–·3 in. long; ♂ spikelets usually few; wings of lower glumes more or less puberulous, ciliate ....2. *Koenigii.*

1. Chionachne semiteres, C. E. C. Fischer n. comb. *Polytoca semiteres,* Benth. ex Hook. f.; F. B. I. vii. 101.

 S. Arcot District (Barber); Tinnevelly District at Palamcottah (Wight).

2. Chionachne Koenigii, Thw. *Polytoca barbata,* Stapf ex Hook. f.; F. B. I. vii. 102; S. I. G. fig. 127.

 Northern Districts as far S. as Bellary and Cuddapah; Nilgiri, N. Coimbatore and Travancore Hills; 200–3,500 ft. Vern. *Kan.* Suku dabha.

4. Spinifex, Linn.

Gregarious, much-branched, woody shrubs. *Leaves* rigid, thickly coriaceous, involute, spreading and recurved. *Inflorescence* dioecious, in large, terminal, globose, bracteate heads with radiating spiciform racemes. *Spikelets* articulate on the short pedicels; ♂ several, distichous in each raceme, 2-flowered; ♀ solitary, 1-flowered. *Glumes* chartaceous, acute, subequal or the upper slightly longer. *Lemmas* subequal, paleate; in ♂ both staminate or the lower empty; in ♀ the lower empty, the upper fertile. *Lodicules* 2, large, connate below, strongly nerved. *Stamens* 3. *Styles* 2, long, united below. *Staminodes* sometimes present in ♀ floret. *Grain* clavate, tipped with rigid style-base, free within the hardened lemma and palea.

Spinifex littoreus, Merr. *S. squarrosus,* Linn.; F. B. I. vii. 63; S. I. G. figs. 105, 106.

Sea-shore sands in all coastal districts.

Whole plant pale grey or glaucous; stems forming thickets; leaves channelled, up to 13 in. long; ♂ heads up to 6 in. diam., bracts and rhachises pungent, spikelets ·36–·4 in. long; ♀ heads up to 13 in. diam.; bracts pungent up to 8 in. long, spikelets hidden at the base of the bracts, up to ·52 in. long.

A useful sand-binder. Vern. *Ur.* Gudukanko; *Tel.* Ravani suruni misalu; *Tam.* Ravanan meesai.

5. Imperata, Cyrill.

Erect, perennial herbs; culms leafy, solid. *Leaves* narrow. *Inflorescence* a terminal, spiciform or thyrsiform panicle. *Spikelets* all alike, generally 2-nate, one short-, the other long-pedicelled, disarticulating from the pedicels; 2-flowered, the lower usually reduced to an empty lemma, rarely ♂. *Glumes* subequal, membranous, enveloped in long silky hairs from the obscure callus and from the lower half of the glume. *Lemmas* hyaline, muticous; the lower usually much smaller than the glumes; the upper still smaller, with a broad palea. *Lodicules* 0. *Stamens* 1–2. *Styles* 2, connate below. *Grain* oblong; embryo half as long or longer.

IMPERATA CYLINDRICA, Beauv.

Var. *Koenigii*, Dur. et Schinz. *I. arundinacea*, Cyr.; F. B. I. vii. 106 *in part.*; S. I. G. fig. 128.

In all Districts, usually in wet situations; sea-level to 7,000 ft. Root-stock stoloniferous, often creeping; culms 1–4 ft. high; leaves 2–2·5 in. long, ·1–·6 in. wide; panicles 1–8·5 in. long, narrow, white-silky hairy. Cotton grass.

Eaten by cattle only when young and tender. Vern. *Hind.* Dabh.; *Tel.* Dharba, Modewa gaddi; *Tam.* Tharpai pullu, Dharbai pul; *Kan.* Sanna dabbai hullu.

6. Miscanthus, Anderss.

Tall, perennial herbs. *Leaves* flat, narrow, long. *Inflorescence* terminal, of numerous spiciform racemes crowded into a usually nodding, fan-shaped corymb; rhachis slender, not articulated. *Spikelets* in similar pairs at the nodes, one long- the other short-petioled, 1-flowered, the callus with long hairs forming a quasi involucre. *Glumes* chartaceous, subsimilar. *Lemmas* hyaline; the lower empty; the upper narrower, 2-toothed or 2-lobed, usually with an awn from the sinus; palea usually minute, containing a bisexual floret. *Lodicules* 2. *Stamens* 2–3. *Styles* 2, free. *Grain* oblong; embryo half as long.

MISCANTHUS NEPALENSIS, Hack.; F. B. I. vii. 107.

Nilgiris at Ootacamund; 7,500 ft. (Narayana and Raju, possibly introduced); without precise locality (Ramaswami).

Culms up to 6 ft. high ; leaves up to 18 in. long and ·6 in. wide ; corymbs up to 9 in. long ; callus of spikelets very short, bearing numerous fine, brown hairs up to ·34 in. long ; glumes brown, ·08–·12 ; awns ·14–·42 in. long.

7. Cleistachne, Bentham.

Annual or perennial erect herbs. *Leaves* flat, elongate. *Panicles* narrow. *Spikelets* solitary, all alike ; pedicels slender with thickened tips. *Glumes* subequal and similar, more or less coriaceous. *Lemmas* hyaline ; the lower empty, without palea ; the upper shorter, entire or 2-toothed, with a stout geniculate awn ; palea short, containing a bisexual floret. *Lodicules* 2, cuneate, ciliate. *Stamens* 3. *Styles* 2, free. *Grain* oblong to obovoid-oblong, free ; embryo half as long.

CLEISTACHNE STOCKSII, Hook. f. ; F. B. I. vii. 162.

Bababudan Hills (Law) ; Travancore at Santhapara, 4,000 ft. (Meebold).

Culms up to 4 ft. high ; leaves 10–16 in. long, ·2–·3 in. wide, more or less soft-hairy, margins spinulose ; panicles 6–10 in. long, rhachis and pedicels slender, rufous-hairy ; glumes ·15–·18 in. long, dark-brown, rufous-hairy ; awns ·5–1 in. long.

8. Saccharum, Linn.

Erect, perennial, tall or very tall herbs ; culms usually solid. *Leaves* narrow, flat, sometimes rolled up when dry. *Inflorescence* of large terminal panicles of racemes, often very silky and showy ; rhachis articulate and fragile. *Spikelets* usually surrounded by long silky hairs from their bases, 2-nate, one pedicelled and falling from the pedicel, the other sessile and falling with the joints of the rhachis ; florets 2. *Glumes* 2, equal, often subcoriaceous or chartaceous below, membranous to hyaline upwards. *Lemmas* hyaline ; the lower empty ; the upper sometimes awned, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free or shortly connate. *Grain* oblong to subglobose ; embryo half as long or shorter.

Callus-hairs at least twice as long as the spikelets; glumes glabrous on the back; lemmas not cuspidate:—

Glumes uniform, whitish throughout, ·12–·15 in. long. Culms up to 20 ft. high; leaves up to 5 ft. long and 2 in. wide; panicles up to 3 ft. long, densely silvery .... 1. *officinarum.*

Glumes coriaceous and brown below, subhyaline and white in the upper ⅔, ·14–·17 in. long. Culms up to 15 ft. high; leaves 1–4 ft. long, ·2–·5 in. wide; panicles up to 2 ft. long, usually rather contracted, silvery ....2. *spontaneum.*

Callus-hairs much shorter than the spikelets; glumes uniformly membranous, pale or brown with darker tips, white- or yellowish-villous on the lower ⅔ of the back; lemmas cuspidate:—

Leaves up to 6 ft. long, ·8–2 in. wide. Culms up to 20 ft. high: panicles effuse, white villous, up to 30 in. long; joints of rhachis ·18–2 in. long, pedicels shorter, both white-villous; glumes ·12 in. long, acute, white-villous except the glabrous upper one of the sessile spikelets ....3. *arundinaceum.*

Leaves up to 3·5 ft. long, ·1–·25 in. wide. Culms up to 10 ft. high: panicles rather contracted, yellowish-villous, up to 16 in. long; joints of rhachis and pedicels ·1–·12 in. long, yellowish-villous; glumes ·15–·19 in. long, acuminate, yellowish-villous.....4. *ciliare.*

1. Saccharum officinarum, Linn.; F. B. I. vii. 118.
   Cultivated in most Districts. The Sugar-cane.
   The sap is extracted from the culms by crushing and boiled down to sugar. The residue after crushing can be utilized for paper making and for cordage. The leaves are used as fodder. Vern. *Hind.* Ukh; *Ur.* Aku; *Tel.* Cheruku; *Tam.* Karumbu; *Mal.* Karimbu; *Kan.* Khabbu.
2. Saccharum spontaneum, Linn.; F. B. I. vii. 118; S. I. G. fig. 129.
   In all Districts, usually near water; sea-level to 5,000 ft.
   A good fodder for buffaloes; the leaves are used for thatching. Vern. *Hind.* Kans; *Tel.* Rellu gaddi.
3. Saccharum arundinaceum, Retz.; F. B. I. vii. 119.
   Tinnevelly District and Travancore.
   The culms are used for hut walls and for screens. Vern. *Tam.* Pi Karumbu; *Kan.* Hodakai hullu.
4. Saccharum ciliare, Anderss. *S. arundinaceum* Retz.; F. B. I. vii. 119 *in part.*
   Ganjam District.

9. Eriochrysis, Beauv.

Perennial herbs. *Leaves* mostly crowded at the base, very narrow. *Inflorescence* a contracted, hairy panicle of spiciform racemes; rhachis articulate, fragile. *Spikelets* 2-nate, one sessile, the other pedicelled, differing usually slightly in size and often in sex, the pedicelled falling from its pedicel, the sessile falling with the contiguous joint of the rhachis and the pedicel. *Florets* 2, the lower reduced to an empty lemma, the upper bisexual or sometimes in the pedicelled spikelet the stamens 0 or rudimentary. *Glumes* subequal, chartaceous or coriaceous. *Lemmas* hyaline, without paleas. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* obovoid to ellipsoid-globose; embryo half as long.

ERIOCHRYSIS RANGACHARII, C. E. C. Fischer in Kew Bull. 1932, 246.

At Pykara, Nilgiri Hills; 6,000 ft. (K. Ranga Achari).

Culms wiry, 5–12 in. high; leaves very narrow, plicate or more or less expanded above with involute margins, basal up to 9 in. long and ·2 in. wide, softly villous; racemes 3–4; spikelets narrowly lanceolate, ·15–·25 in. long, surrounded by long, dense, rufous hairs; glume-margins long rufous-ciliate; florets of both spikelets usually bisexual.

10. Spodiopogon, Trin.

Tall, usually perennial herbs. *Leaves* flat, often petioled. *Inflorescence* of panicled 2–3-nate spikelets; rhachis jointed. *Spikelets* usually one sessile and 1–2-pedicelled, 1–2-flowered, the lower ♂, or empty, the upper bisexual. *Glumes* subequal, membranous, sometimes aristate. *Lemmas* hyaline; lower plicate, paleate or not; upper deeply 2-fid or 2-partite with a long slender awn from the sinus, its palea short. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* free, narrowly fusiform.

SPODIOPOGON ALBIDUS, Benth.; F. B. I. vii. 108.

Mysore State; W. Coast and Ghâts; Ramandrug and Hospet in the Bellary District; up to 7,000 ft.

Culms tufted, much branched, straggling, up to 4 ft. high; leaves flaccid, acuminate, often aristate, 2–10 in. long, ·4–1·4 in. wide, base narrowed into a petiole ·4–3·5 in. long; panicle

at first enclosed in a long spathaceous sheath; rhachis and pedicels more or less densely silky-hairy; glumes ·22–·27 in. long, sometimes aristate, more or less villous; lemmas ·16–·24 in. long; awns ·5–·8 in. long.

11. Dimeria, R. Br.

Slender, annular or perennial herbs. *Leaves* narrow. *Inflorescence* of terminal solitary, twin or fascicled slender spikes or, more usually, spiciform racemes; rhachis inarticulate, terete, angular or flat. *Spikelets* solitary, secund, bifarious, laterally strongly compressed, articulate on the rhachis or on a very short, rarely long, pedicel, 2-flowered. *Glumes* 2, rigid, coriaceous, chartaceous or membranous, keeled, often divaricate in flower, subequal or the upper larger, with usually hyaline margins and the keel sometimes winged. *Lemmas* shorter, hyaline; the lower empty and without palea; the upper complicate, bifid with a slender long awn from the sinus, its palea small, containing a bisexual floret. *Lodicules* 0 or 2, minute, rarely well developed. *Stamens* 2 or 3. *Styles* 2, free. *Grain* linear, compressed, free within the lemmas.

Rhachis of raceme terete or angled; leaves sparingly ciliate; awns geniculate:—

Internodes of rhachis less than half as long as the upper glume; glumes coriaceous, upper ·2–·3 in. long including an arista, winged all down the keel and ciliate. Culms 3–7 in. high; leaves 1–2 in. long; racemes solitary; callus ·05 in. long ....1. *avenacea.*

Internodes more than half as long as the upper glume; glumes chartaceous, not winged; callus very short:—

Racemes 2, rarely 3 or 1, ·9–1·6 in. long. Culms very slender, 5–8 in. high; leaves 1 in. long; glumes subequal, about ·13 in. long; upper lemma ·11 in. long; awn ·28 in. long 2. *Hohenackeri.*

Racemes 3–5 or more, 3–5 in. long. Culms 2–3 ft. high; leaves 2–6 in. long; lower glume ·14–·26 in. long, acuminate, upper ·15–·28 in. long; upper lemma ·13–·21 in. long; awn ·3–·45 in. long ....3. *gracilis.*

Rhachis of raceme flat, sometimes keeled on one face:—

Awns geniculate:—

Glumes not winged or upper sometimes narrowly so at apex only:—

Culms slender or very slender; leaves and sheaths glabrous or sparingly hairy, not villous, ·1 in. wide; glumes membranous:—

Margins of rhachis ciliate. Culms 2–20 in. high; leaves 1–2 in. long; sparingly ciliate; racemes solitary or twin, ·7–2·5 in. long; glumes ciliate, lower ·1–·17 in. long, upper ·11–·2 in. long, often narrowly winged at apex; upper lemma ·07–·09 in. long; awn ·28–·4 in. long ....4. *Thwaitesii.*

Margins of rhachis glabrous or asperulous; leaves more or less hairy; racemes 2- or 3-nate, ·7–2 in. long; glumes not ciliate or the upper at the apex only:—

Rhachis ·03 in. wide. Culms 2–10 in. high; leaves 1–3 in. long; lower glume ·08–·1 in. long, upper ·1–·2 in. long; upper lemma ·07–·08 in. long; awn ·3–·4 in. long
5. *ornithopoda.*

Rhachis very slender. Culms 4–14 in. high; leaves 1–1·5 in. long; lower glume ·06–·07 in. long, upper ·07–·08 in. long; upper lemma ·05–·066 in. long; awn ·23–·3 in. long ....6. *tenera.*

Culms comparatively robust, up to 2 ft. high; leaves and sheaths usually densely villous, 3–6 in. long, ·2 in. wide; racemes usually 2, 2·5–3 5 in. long; rhachis ·03–·05 in. wide, its margins villous; glumes chartaceous, villous, lower ·15–·18 in. long, upper ·18–·2 in. long, apex sometimes narrowly winged; upper lemma ·1–·14 in. long; awn ·3–·4 in. long
7. *pubescens.*

Upper glume distinctly winged, wing corky:—

Racemes usually solitary, ·7–1·3 in. long. Culms 2–8 in. high; leaves 1–2 in. long; margins of rhachis ciliate; lower glume ·17 in. long, not winged, upper ·18–·22 in. long, keel narrowly winged throughout and ciliate; upper lemma ·12–·13 in. long; awn ·36–·45 in. long ....8. *Lawsoni.*

Racemes 2- or 3-nate, ·5–1·2 in. long. Culms 7–14 in. high; leaves 2–3 in. long; rhachis glabrous; lower glume ·12–·16 in. long, its keel narrowly winged throughout, upper ·13–·17 in. long, its keel broadly winged and ciliate; upper lemma ·1–·15 in. long; awn ·35–·42 in. long ....9. *bialata.*

Awns not geniculate, ·3–·33 in. long. Culms 10–18 in. high: leaves 2–6·5 in. long, glabrous or nearly so; racemes 2- or 3-nate, 2–5 in. long: lower glume ·1–·12 in. long, obtuse, upper ·13–·15 in. long, ciliate, sometimes narrowly winged at apex; upper lemma ·1–·12 in. long.................................10. *Lehmanni.*

1. Dimeria avenacea, C. E. C. Fischer, n. comb. *D. pusilla*, Thw.; F. B. I. vii. 103.
   Mahendragiri, Ganjam District (Fischer); Kambakkam, Nellore District (Bourne); Tranquebar (Koenig *fide* Retzius).
2. Dimeria Hohenackeri, Hochst.; F. B. I. vii. 103.
   Mangalore (Hohenacker).
   In rice fields.
3. Dimeria gracilis, Nees; F. B. I. vii. 105.
   S. Kanara District.
4. Dimeria Thwaitesii, Hack. *D. pusilla*, Thw. var. *pallida*, Thw.; F. B. I. vii. 103.
   W. Coast; Madras; Travancore; sea-level to 3,000 ft.
   In rice fields.
5. Dimeria ornithopoda, Trin.; F. B. I. vii. 104 *in part.*
   Mysore State, 2,000–3,000 ft. (Meebold); Malabar; Travancore.
6. Dimeria tenera, Trin. *D. ornithopoda*, F. B. I. vii. 104 *in part.*
   Godavari District at Bison Hill (Barber); S. Kanara and Malabar Districts; Bababudan, Mysore, Nilgiri and Travancore Hills; from sea-level to 5,000 ft.
7. Dimeria pubescens, Hack.; F. B. I. vii. 105.
   Mysore State, 3,000–3,500 ft. (Meebold).
   In wet localities.
8. Dimeria Lawsoni, C. E. C. Fischer n. comb. *D. pusilla*, Thw. var. *Lawsoni*, Hook. f.; F. B. I. vii. 103.
   Mysore (Meebold); Coorg (Lawrie); Wynaad (Lawson); 2,000–3,000 ft.
   On granite rocks (Meebold).
9. Dimeria bialata, C. E. C. Fischer in Kew Bull., 1933, 351.
   S. Kanara District at Siradi (Meebold).
10. Dimeria Lehmanni, Hack.; F. B. I. vii. 104.
    Kambakkam Hills (Bourne).

12. Pogonatherum, Beauv.

Slender annual or perennial erect herbs. *Culms* branching, leafy. *Leaves* flat, narrow, suberect. *Racemes* terminal, solitary; rhachis fragile. *Spikelets* 2-nate, one sessile the other pedicelled,

1–2-flowered; callus bearded with fine hairs. *Glumes* membranous; lower truncate, rounded on the back; upper usually longer, keeled, 2-fid with a long slender awn from the sinus. *Lemmas* hyaline; lower usually absent from the pedicelled spikelet; upper 2-fid, with a slender awn from the sinus, its palea broad, containing a bisexual floret. *Lodicules* 0. *Stamens* 1–2. *Styles* 2, free, short. *Grain* oblong, free; embryo $\frac{2}{3}$ as long.

POGONATHERUM PANICEUM, Hack. *P. saccharoideum*, Beauv.; F. B. I. vii. 141.

Godavari District; Mysore State at 2,000 ft. (Meebold); W. Coast and Ghâts; up to 6,000 ft.

Culms 2–12 in. high, tufted; leaves ·8–2 in. long, ·05–·1 in. wide; racemes ·5–1·3 in. long; rhachis subtrigonous, joints and flat pedicels ·03–·05 in. long, long-ciliate; hairs of callus white, ·1–·18 in. long; glumes ·04–·09 in. long; lemmas ·03–·07 in. long; awns ·5–1 in. long.

13. Eulalia, Kunth

Annual or more often perennial, erect herbs. *Leaves* narrow. *Inflorescence* of digitate or fascicled, rarely solitary, spiciform racemes; rhachis readily disarticulating; joints and pedicels long-ciliate. *Spikelets* 2-nate, similar, one pedicelled, the other sessile. *Glumes* 2, subequal, membranous or chartaceous; lower dorsally flat or depressed with inflexed, more or less keeled margins; upper usually boat-shaped, 1-keeled. *Lemmas* hyaline, dissimilar; lower ♂ or empty, sometimes suppressed, rarely with a palea; upper usually much shorter, rarely entire, usually 2-fid, often deeply so, with a long awn from the sinus, usually without palea, enclosing a bisexual floret. *Lodicules* 2. *Stamens* usually 3. *Styles* 2, free. *Grain* oblong or obovate-oblong; embryo $\frac{1}{2}$–$\frac{2}{3}$ as long.

Leaves flat, acute, 3–9 in. long, ·2–·45 in. wide. Culms 2–3 ft. high; racemes 4–8, 2–6 in. long; joints and pedicels ·14–·16 in. long; glumes ·21–·24 in. long, lower 4-nerved, at least in the pedicelled spikelet; upper lemma ·1–·15 in. long, its awn ·44–·63 in. long
1. *quadrinervis* var. *Wightii.*

Leaves usually convolute, finely acuminate, up to 16 in. long, ·1–·25 in. wide; lower glume nerveless or 2-nerved :—

Hairs of the racemes white. Culms 9–43 in. high, quite glabrous; lower sheaths glabrous; racemes 2–17, rarely 1, 1·5–8 in. long; joints and pedicels ·08–·11 in. long; glumes ·1–·16 in. long; upper lemma ·06–·1 in. long, hardly wider than its awn; awn ·38–·54 in. long.............................2. *tristachya*.
Hairs of the racemes usually reddish-brown, rarely greyish; culms 10–52 in. high, densely white- or brown-silky for a short distance below the inflorescence; lower sheaths usually red-brown tomentose at the base; racemes 2–11, 1–5·5 in. long; joints and pedicels ·1–·16 in. long; upper lemma ·1–·17 in. long, decidedly wider than its awn; awn ·5–·8 in. long ....3. *phaeothrix*.

1. EULALIA QUADRINERVIS, O. Ktz.

Var. *Wightii*, Hook. f. *Pollinia quadrinervis*, Hack. var. *Wightii*, Hook. f.; F. B. I. vii. 110.

Rampa Hills at 4,500 ft. (Narayanswami); Pulney Hills; 6,000–7,000 ft. (Wight, Bourne).

2. EULALIA TRISTACHYA, O. Ktz. *Pollinia argentea*, Trin.; F. B. I. vii. 111.

W. Coast and Ghâts; Kambakkam Hills; sea-level to 5,000 ft.

A good fodder when young.

3. EULALIA PHAEOTHRIX, O. Ktz. *Pollinia phaeothrix*, Hack.; F. B. I. vii. 112.

Rampa Hills (Narayanswami); N. Coimbatore and Sirumalai Hills; W. Ghâts; 3,000–8,800 ft.

Very common in open downs at high elevations.

14. Pseudopogonatherum, A. Camus

Annual erect herbs. *Leaves* very narrow, often inrolled. *Inflorescence* of few to many spiciform racemes approximate on a common, persistent axis. *Spikelets* 2-nate, both pedicelled and falling from the pedicels or less often one of them sessile and falling with the pedicel of the other. *Glumes* chartaceous or membranous, lower rounded or flat on the back with inflexed margins, upper often aristate or mucronate. *Lemmas* hyaline, lower ♂, empty or sometimes suppressed, upper narrow, often bifid, with a long awn. *Lodicules* 2. *Stamens* usually 3. *Styles* 2, free. *Grain* oblong or obovate-oblong; embryo $\frac{1}{2}$–$\frac{2}{3}$ as long.

PSEUDOPOGONATHERUM CONTORTUM, A. Camus. *Pollinia articulata*, Trin.; F. B. I. vii. 109.

Goomsur in Ganjam District (Gamble); Kodagundi Reserved Forest in Vizagapatam District (Jacob).

Culms up to 3·5 ft. high; leaves 4–10 in. long, ·05–·07 in. wide; racemes 4–13, 1–2·5 in. long, rhachis and pedicels white-hairy; both spikelets pedicelled; lower glume ·08–·09 in. long, ciliate, upper with a capillary awn ·12–·17 in. long; awn of upper lemma geniculate, ·7–·8 in. long.

15. Microstegium, Nees

Annual or perennial, erect or decumbent herbs. *Leaves* flat, narrowed to the base and often petioled. *Inflorescence* of fascicled, spiciform racemes; rhachis readily disarticulating; joints and pedicels usually long-ciliate. *Spikelets* 2-nate, one sessile, the other pedicelled, similar. *Glumes* membranous or chartaceous, the lower dorsally longitudinally channelled, with more or less keeled margins, upper boat-shaped, medially keeled. *Lemmas* hyaline, lower ♂ or empty, rarely paleate, sometimes absent, upper much shorter, 2-fid with a long awn from the sinus, usually without palea. *Lodicules* 2. *Stamens* 1, 2 or 3. *Styles* 2, free. *Grain* oblong or obovate-oblong.

Racemes 2–10, fascicled, 1·5–3 in. long; margins of joints and pedicels densely ciliate; callus shortly bearded. Culms up to 4 ft. high; leaves sometimes shortly petioled, 1–4·5 in. long, ·2–·5 in. wide; glumes of sessile spikelet ·14–·15 in. long; awns very slender, ·2–·4 in. long ....1. *ciliatum*.

Racemes 3–6, somewhat distant, 1–4 in. long; joints and pedicels slender, glabrous or slightly ciliate at the base only; callus not bearded. Culms up to 5 ft. high; leaves 1–2 in. long, ·3–·5 in. wide; glumes of sessile spikelet ·15–·18 in. long; awns capillary ·5–·7 in. long ....2. *nudum*.

1. MICROSTEGIUM CILIATUM, A. Camus. *Pollinia ciliata*, Trin.; F. B. I. vii. 116.

   Pulney and Travancore Hills; 6,000 ft.

2. MICROSTEGIUM NUDUM, A. Camus. *Pollinia nuda*, Trin.; F. B. I. vii. 117.

   Pulney Hills; 5,000–7,000 ft.

16. Pollinidium, Stapf ex Haines

Densely tufted perennial herbs; rootstock and basal sheaths woolly. *Leaves* convolute, wiry. *Inflorescence* of more or less panicled, digitate or fascicled, spiciform racemes; rhachis compressed, articulated, fragile. *Spikelets* 2-nate, one sessile, the other pedicelled, similar; callus densely clothed with long brown hairs. *Glumes* 2; lower flattened, 2–3-toothed, 5–7-nerved, margins inflexed, hairy on the back at the base; the upper cymbiform, cuspidate or aristate, 3–5-nerved. *Lemmas* hyaline; lower elliptic, its palea finely ciliate; upper narrow, conduplicate, entire or 2-toothed, finely awned from the tip or the sinus, its palea broad, nearly as long, densely ciliate at the apex. Other characters as in *Ischaemum.*

POLLINIDIUM BINATUM, C. E. Hubbard. *Ischaemum angustifolium,* Hack.; F. B. I. vii. 129.

Ganjam, Vizagapatam and Godavari Districts.

Culms 1–3 ft. high; leaves up to 3 ft. long and ·16 in. wide; the old sheaths white-woolly at the base; racemes 1–4, 1–2 in. long; joints slender, ·12–·16 in. long, glabrous or with a line of hairs, densely rusty- or golden-villous at the base, pedicels similar, shorter; lower glumes chartaceous, ·13–·16 in. long; upper lemmas ·13–·15 in. long; awns ·16–·28 in. long.

Used for paper-making and locally for fibre, cordage and mats. Eaten by cattle when young. Vern. *Hind.* Bhabar, Sabai; *Ur.* Babuli.

17. Ischaemum, Linn.

Usually perennial. *Leaves* convolute when young, eventually flat, usually narrow, sometimes petioled. *Inflorescence* of twin, digitate, fascicled or corymbose spiciform racemes; rhachis compressed, readily disarticulating; joints and pedicels flattened or subconcave on the inner side, often stout. *Spikelets* 2-nate, one sessile or with a short pedicel and falling with the contiguous joint. the other long-pedicelled and falling from the pedicel, the pairs alike or differing only in sex or more or less heteromorphous; florets 2, generally the lower ♂, the upper bisexual, rarely ♂ or empty in the long pedicelled spikelet. *Glumes* subequal, lower

flattened or somewhat convex, rarely concave on the back, coriaceous below, chartaceous and sometimes strongly nerved towards the apex, seldom chartaceous throughout, entire or 2-fid and cuspidate, with more or less keeled, inflexed margins; upper glume boat-shaped, medially keeled at least towards the apex, sometimes awned. *Lemmas* hyaline to rigidly membranous; lower muticous; upper of sessile spikelet usually 2-fid and geniculately awned from the sinus, rarely mucronate or muticous; that of the long-pedicelled spikelet sometimes similar but more often entire and awnless; the paleas hyaline, subequal to the lemmas. *Lodicules* 2. *Stamens* 3, sometimes small or rudimentary in the fertile florets. *Styles* 2, free. *Grain* oblong or lanceolate, dorsally compressed; embryo about half as long.

Sessile spikelets, at least, awned :—
  Margins of lower glume of sessile spikelets expanded below the middle, incurved at the base, apex 2-toothed or -cuspidate; upper lemmas of both spikelets 2-lobed to about the middle with an awn from the sinus :—
    Racemes 2, rarely 3 :—
      Lower glume of sessile spikelet distinctly winged at apex, ·15–·18 in. long, upper glume and lower pedicelled spikelet 1-keeled and winged at the apex. Culms often creeping at the base, 2–30 in. high; leaves rounded or narrowed at the base, sessile, 1·5–9·5 in. long, ·05–·5 in. wide, sparsely to densely hairy; awns ·3–·5 in. long.............. 1. *aristatum.*
      Lower glume of sessile spikelets not winged. Culms slender, up to 3 ft. high :—
        Lower leaves, at least, acute at base, hairy, 1–3·2 in. long, ·2–·5 in. wide, often narrowed into a rather broad petiole up to ·75 in. long; racemes ·8–2·5 in. long; rhachis distinctly undulate; lower glume of sessile spikelets ·13–·18 in. long, ribbed at the apex, more or less hirsute, upper glume minutely 2-lobed, mucronate or cuspidate, keeled upwards, not winged; awns of sessile spikelets ·28–·54 in. long, of pedicelled shorter and finer .... 2. *timorense.*
        Leaves rounded or attenuate at base, 2–4 in. long, ·15–·25 in. wide, glabrous or with a few ciliae, sometimes the lowest tapering into a petiole up to 1 in. long; racemes 1–2 in. long; rhachis nearly straight; lower glume of sessile spikelets ·14–·26 in. long, strongly nerved at apex, bristly in the

middle or hirsute below the middle, upper glume keeled and narrowly winged upwards, with a tuft of hairs below the wing, apex minutely 2-toothed with an arista ·1–·28 in. long; awns of both spikelets ·4–1 in. long .... 3. *Thomsonianum.*

Racemes corymbose, 7–12, rarely as few as 3 or up to 16, 1·5–3·5 in. long, silvery hirsute. Culms robust, rooting below, up to 24 in. high; leaves sessile, usually narrowed at base, sometimes rounded, 2·5–9·5 in. long, ·2–·75 in. wide, softly hairy, rarely glabrous; lower glume of sessile spikelets not winged; awns of both spikelets ·3–·45 in. long.................. 4. *nilagiricum.*

Margins of glumes narrowly inflexed, not expanded below; lower glume of pedicelled spikelets flat, 2-keeled:—

Lower glume, at least, of pedicelled spikelet, winged, its upper lemma entire, awnless; Racemes 2–3, rarely 1:—

Lower glume of sessile spikelets ·34–·36 in. long with 3–4 nodules on each margin in the lower part, sometimes connected by rounded transverse ridges, keels narrowly winged. Whole plant glabrous; culms robust; leaves rounded or emarginate at the base, sessile, up to 15 in. long and 1·3 in. wide; racemes 3, up to 4·3 in. long; joints ·1 in. wide; lower glume of pedicelled spikelets smooth, with a wide wing on one keel; lemmas brown, awn of sessile spikelets ·36 in. long....... 5. *Koenigii.*

Lower glume of sessile spikelets ·16–·28 in. long; rhachis of racemes, at least, hairy:—

Pedicels usually more than ½ as long as the sessile spikelets, rarely only ⅓. Culms slender, erect, 5–36 in. high; leaves rounded or emarginate at base and sessile or narrowed into a petiole up to 2 in. long, more or less hairy, ·8–6 in. long, ·12–·7 in. wide; racemes 1–2·8 in. long; lower glume of sessile spikelets smooth or with 1–3 shallow marginal nodules usually joined by shallow curved, transverse ridges, keels narrowly winged above, glabrous, lower glume of pedicelled spikelets smooth, one keel widely winged, the other wingless or very narrowly winged at apex; awn ·3–·54 in. long .... 6. *commutatum.*

Pedicels less than half as long as the sessile spikelet:—

Leaves, at least the lower, cordate or sagittate at base:—

Pedicels and joints plano-convex, ciliate to densely villous; lower glume of sessile spikelets with 3–6 marginal nodules below the middle, usually connected by transverse ridges, sometimes smooth, keels usually narrowly winged at apex:—

Leaves, at least some, petioled, base deeply cordate to acutely sagittate, ·8–3·5 in. long, ·2–·5 in. wide. Culms slender, often decumbent at base, up to 20 in. high; racemes 1–2 in. long; lower glume of sessile spikelets narrowly lanceolate, transverse ridges usually irregular and shallow, rarely regular and deep; lower glume of pedicelled spikelets similar but more often smooth or the nodules and ridges more shallow and one keel broadly winged; awn ·42–·9 in. long
7. *semisagittatum.*

Leaves all sessile, shallowly cordate, 2–6·5 in. long, ·15–·4 in. wide. Culms rather stout, up to 36 in. high; racemes 2–4·6 in long; lower glume of sessile spikelets ovate- or lanceolate-oblong; lower glume of pedicelled spikelets smooth or sometimes faintly noduled. one keel with a wide crescent-shaped wing; awn ·4–·76 in. long .... 8. *molle.*

Pedicels and joints acutely trigonous, outer angle long-ciliate. Culms erect from a prostrate base, 10–16 in. high; leaves more or less cordate at base, sessile or petioled, ·8–3·4 in. long, ·12–·4 in. wide, petioles up to 1 in. long; racemes 1–2·8 in. long; lower glume of sessile spikelets obliquely linear-lanceolate, margins in basal ⅔ with 2–5 horny, large, almost keeled nodules, quite smooth between the margins, in the apical ⅓ one keel broadly, the other narrowly winged; lower glume of pedicelled spikelets similar but smooth; upper lemma of sessile spikelets usually 2-lobed to below the middle, its awn ·4–·68 in. long, that of the pedicelled spikelet tapered into a fine arista ·1–·15 in. long... 9. *Rangacharianum.*

Leaves not cordate or sagittate:—

Lower glume of sessile spikelets with 5 horny, usually sharp, deep, regular, seldom irregular, transverse ridges in the lower part, the keels unequally winged in the upper part. Culms stout, 12–45 in. high; leaves tapered to an acute base, 6–13 in. long, ·15–·4 in. wide; racemes 1–3·2 in. long; joints and pedicels plano-convex, stout, outer margin hairy; lower glumes of pedicelled spikelets smooth or more or less ridged, one keel with a wide crescent-shaped wing; lemma of sessile spikelet 2-lobed to below the middle; awn ·5–·8 in. long ....10. *rugosum.*

Lower glume of sessile spikelets with marginal nodules not extended across the glume or if meeting the ridges very shallow and irregular; lower glume of pedicelled spikelets with one broad and one narrow wing. Culms rather stout, up to 3 ft. high:—

Lower glume of sessile spikelets not or very narrowly winged at apex, below with 2–6 rounded marginal nodules sometimes joined by shallow irregular transverse ridges. Leaves 2·5–6 in. long, ·4–·65 in. wide, base rounded, sometimes with a short tomentose petiole; racemes 2·5–4·5 in. long; joints and pedicels obtusely trigonous, glabrous or sparsely hairy on the back; lower glume of pedicelled spikelets oblong, smooth or rugulose; awn up to ·62 in. long, sometimes short or even absent..............11. *travancorense.*

Lower glume of sessile spikelets oblique, the basal ⅔ with 2–5 marginal nodules, smooth between the margins, one keel broadly the other narrowly winged at apex. Leaves tapering to the base, 1·5–9·5 in. long, ·1–·25 in. wide; racemes 1·5–4 in. long; joints and pedicels acutely trigonous, up to ·1 in. wide, one angle hairy; lower glume of pedicelled spikelets lanceolate, smooth; awn ·23–·52 in. long..12. *mangaluricum.*

Glumes not winged. Rhizome stoloniferous; culms erect, up to 4 ft. high; leaves 2–14 in. long, ·15–·33 in. wide; racemes 3–6, rarely only 2, 3–8 in. long; joints and pedicels subclavate, compressed, yellow- or brownish-pilose; lower glumes of both spikelets narrowly lanceolate; awn slender, ·3 in. long; upper lemma of pedicelled spikelets shortly 2-lobed, with a slender arista ·1–·2 in. long ....13. *pilosum.*

Both spikelets awnless. Rhizome creeping, stout; culms erect, slender, 7–20 in. high; leaves 1–5·4 in. long, ·15–·5 in. wide, base rounded or shallowly cordate, sometimes very shortly petioled; racemes 2, ·9–1·5 in. long; joints and pedicels stout, sharply trigonous, more or less ciliate; lower glumes of both spikelets smooth, shining, ·25 in. long, narrowly winged at apex; lemma of sessile spikelet shortly 2-lobed, usually with a mucro ....14. *muticum.*

1. Ischaemum aristatum, Linn. *I. ciliare,* Retz.; F. B. I. vii. 133; S. I. G. figs. 135, 136.

Common in all Districts; sea-level to 8,000 ft.

Vern. *Tel.* Erruthota gaddi; *Kan.* Mobbu ganjalu garikai hullu.

Var. *Barberi*, C. E. C. Fischer n. var. More robust, nearly glabrous, more coriaceous; lower glume of sessile spikelet with wide ear-shaped wings at apex; upper lemma of pedicelled spikelets with a slender arista ·1–·2 in. long.

Mangalore (Barber No. 4803).

2. ISCHAEMUM TIMORENSE, Kunth; F. B. I. vii. 136.

W. slopes of Nilgiris; N. Coimbatore Hills; W. Coast in Malabar and Travancore; up to 3,000 ft.

Vern. *Kan.* Nilamunga hullu.

Var. *villosum*, C. E. C. Fischer n. var. Joints of rhachis, pedicels and lower glume of sessile spikelets densely villous.

3. ISCHAEMUM THOMSONIANUM, Stapf MS., n. nom. *I. murinum.* Hook. f. non Forst.; F. B. I. vii. 135.

Mysore; Cochin; Travancore; up to 3,000 ft.

4. ISCHAEMUM NILAGIRICUM, Hack. *I. hirtum*, Hook. f. non Hack.; F. B. I. vii. 135 *in part.*

Kistna (Barber) and Salem Districts; Nilgiri and Pulney Hills; up to 6,500 ft.

5. ISCHAEMUM KOENIGII, Stapf MS. n. comb. *I. aristatum*, Hook. f. non Linn. subsp. *Koenigii*, Hook. f.; F. B. I. vii. 127.

Precise locality unknown (Koenig).

6. ISCHAEMUM COMMUTATUM, Hack.; F. B. I. vii. 131.

W. Ghâts; 2,000–7,000 ft.

7. ISCHAEMUM SEMISAGITTATUM, Roxb.; F. B. I. vii. 130. *I. conjugatum*, Roxb.; F. B. I. vii. 131.

W. Coast and Ghâts; up to 4,000 ft.

8. ISCHAEMUM MOLLE, Hook. f.; F. B. I. vii. 128.

Mysore State, 2,000–3,500 ft. (Meebold); W. Coast, near sea-level.

9. ISCHAEMUM RANGACHARIANUM, C. E. C. Fischer in Kew Bull., 1933, 352; *I. aristatum*, Ranga Achariar et Tadulingam non Linn.; S. I. G. fig. 130.

Malabar and Travancore; at low elevations.

10. ISCHAEMUM RUGOSUM, Salisb.; F. B. I. vii. 127; S. I. G. fig. 132.

In all Districts; up to 6,000 ft.

Eaten when young by horses and cattle; grain occasionally eaten by the poor. Vern. *Tam.* Kadukken pillu.

11. ISCHAEMUM TRAVANCORENSE, Stapf ex C. E. C. Fischer in Kew Bull., 1933, 353.
    Wynaad and Travancore.
12. ISCHAEMUM MANGALURICUM, Stapf M.S. n. comb. *I. aristatum*, Hook. f. non Linn. var. *mangaluricum*, Hack.; F. B. I. vii. 127; S. I. G. fig. 131.
    Mysore State (Meebold); S. Kanara and Malabar Districts; up to 2,000 ft.
13. ISCHAEMUM PILOSUM, Hack.; F. B. I. vii. 130; S. I. G. figs. 133, 134.
    Deccan.
    A moderate fodder. Vern. *Tel.* Kundara gaddi, Urranki.
14. ISCHAEMUM MUTICUM, Linn.; F. B. I. vii. 132.
    S. Kanara and Travancore.
    Usually growing in water; also among coastal sands.

18. Sehima, Forsk.

Annual or perennial erect, tufted herbs. *Leaves* convolute when young, later expanded. *Racemes* solitary, often much curved; rhachis jointed, fragile; joints and pedicels plano-convex. *Spikelets* compressed, 2-nate, one sessile, the other pedicelled; 2-flowered; lower floret ♂, upper bisexual in the sessile spikelet, ♂ or neuter in the pedicelled. *Glumes* subequal, usually chartaceous; lower of sessile spikelets usually deeply grooved, rarely flat, 2-toothed or -cuspidate, keeled upwards and often winged on the keels; upper boat-shaped, often aristate. *Lemmas* hyaline; the lower entire and muticous; the upper 2-fid with a geniculate awn from the sinus. *Lodicules* 2. *Stamens* 3. *Grain* oblong, obtusely trigonous; embryo half as long.

Joints and pedicels ·14–·18 in. long, ciliate on both edges; lower glume of sessile spikelets ·25–·28 in. long, strongly 4-nerved, the 2 median branched, diverging and converging again with a deep depression between; callus ·04–·05 in. long; upper glume ·21–·26 in. long, entire, keel narrowly winged at the apex, with a setaceous arista ·43–·6 in. long; awns 1·2–1·6 in. long. Culms up to 4 ft. high; leaves 3–20 in. long, ·1–·3 in. wide ....1. *nervosum*.
Joints and pedicels ·18–·26 in. long, ciliate on one margin only; lower glume of sessile spikelets ·28–·34 in. long, strongly 4-nerved, the 2

median straight, close together with a groove between; callus ·05–·08 in. long; upper glume ·23–·27 in. long, 2-cuspidate, not winged, with a setaceous arista ·36 in. long; awns 1–1·8 in. long. Culms weak, up to 2 ft. high; leaves 3·5–6 in. long, ·1–·2 in. wide....2. *sulcatum.*

1. SEHIMA NERVOSUM, Stapf. *Ischaemum laxum*, R. Br.; F. B. I. vii. 136; S. I. G. fig. 137.

   In all Districts except the W. Coast; sea-level to 6,000 ft.

   A good fodder. Vern. *Hind.* Chota shadai ghans; *Tam.* Kura itti; *Kan.* Sinna shadai hullu, Nalai hullu.

2. SEHIMA SULCATUM, A. Camus. *Ischaemum sulcatum*, Hack.; F. B. I. vii. 137.

   Nellore and Kistna Districts (Bourne).

19. Lophopogon, Hackel

Small, perennial, densely tufted herbs. *Leaves* very narrow. *Inflorescence* of terminal, solitary, binate or fascicled, spiciform racemes; rhachis articulate, more or less fragile; joints often cupular at the tip. *Spikelets* 1–2-flowered, 2-nate, one sessile the other pedicelled. *Sessile spikelet* with a short callus, dorsally compressed. *Glumes* chartaceous; the lower truncate, irregularly toothed; the upper longer, acute, apiculate or narrowed into a straight awn. *Lemmas* hyaline; the lower with a linear palea and empty or ♂ with 1–2 stamens; upper often 2-fid with setiform lobes, often aristate from the sinus, its palea quadrate, containing a bisexual or ♂ floret with 2 anthers. *Lodicules* 0. *Pedicelled spikelet* laterally compressed or nearly terete, 2-flowered, the lower floret often ♂, the upper ♀.

LOPHOPOGON TRIDENTATUS, Hack.; F. B. I. vii. 149; S. I. G. fig. 141.

Cuddapah, Nellore, Chittoor and Chingleput Districts; Mysore State; sea-level to 2,000 ft.; usually in dry localities.

Culms very slender, capillary at apex, often densely white-silky at the base, 3–20 in. high; leaves 1–6 in. long; racemes usually 2, ·3–·9 in. long; lower glumes narrowly obcuneate, 3-toothed or mucronate and lobulate, with a tuft of rufous hairs in the middle, ·17–·19 in. long; upper glume narrowly boat-shaped, ·18–·22in. long, narrowed to a fine arista ·25–·4 in. long, margins with long rufous hairs; awns ·6–·9 in. long.

20. Apocopis, Nees

Annual or perennial herbs. *Leaves* flat. *Racemes* terminal, solitary or 2–3-nate; rhachis not readily disarticulating. *Spikelets* secund, closely imbricate, compressed, solitary, sessile, often accompanied by a pedicel without spikelet. *Glumes* 2, chartaceous or membranous; lower broadly cuneiform, nearly flat, truncate, rounded or emarginate; upper narrower, usually laterally 2-keeled with broadly inflexed margins. *Lemmas* hyaline; lower oblong, its palea nearly as long, enclosing a ♂ floret or empty; upper very narrow, entire or shortly 2-lobed with a long geniculate awn, its palea much shorter, wrapped round a ♀ or bisexual floret. *Lodicules* 0. *Stamens* 2 or 3. *Styles* 2, free. *Grain* linear or fusiform; embryo half as long.

Apocopis Wightii, Nees; F. B. I. vii. 142; S. I. G. figs. 139, 140.

In all Districts, except in the driest localities; sea-level to 3,000 ft.

Culms often densely tufted, 2·5–24 in. high; leaves densely imbricate or distant, ·5–5 in. long, ·05–·25 in. wide, more or less hairy from bulbous bases; racemes usually 2, ·5–1·7 in. long, rhachis and pedicels rufous-hairy; lower glume obcordate or obovate truncate, yellow with a red-brown tip or dark-brown with a yellowish tip, glabrous to densely rufous- or fuscous-hairy, ·14–·2 in. long; awn geniculate, ·75 in. long.

21. Eremochloa, Buese

Perennial herbs. *Leaves* more or less equitant, rigid, flat. *Inflorescence* a terminal, solitary, spiciform raceme; rhachis articulated, fragile. *Spikelets* secund, solitary owing to the pedicelled spikelets being reduced to a rudimentary pedicel, sessile, imbricating, dorsally compressed, 2-flowered. *Glumes* chartaceous or coriaceous; lower nearly flat, oblong to subcircular, 2-keeled, the margins pectinate with long spinules or rigid hairs, often winged at the apex; upper elliptic or oblong-lanceolate, 3–5-nerved. *Lemmas* hyaline, muticous, paleate; lower ♂; upper smaller ♀ or bisexual. *Lodicules* 2. *Stamens* 3. *Grain* elliptic or ovoid, flattened on one side; embryo half as long.

EREMOCHLOA MURICATA, Hack.; F. B. I. vii. 140; S. I. G. fig. 138.
Chingleput and S. Arcot Districts.
Culms 5–24 in. high; leaves densely tufted below, ·15–·27 in. wide, exactly linear, sometimes with a few ciliae near the rounded base; raceme 2·5–4·5 in. long; lower glume thickly coriaceous, broadly ovate, acute, the upcurved marginal spinules up to ·07 in. long, apex with a broad triangular or fan-shaped wing on both sides, wider across than the width of the rest of the glume.

22. Arthraxon, Beauv.

Annual or perennial, sometimes decumbent herbs. *Leaves* linear-lanceolate to ovate, base usually cordate or amplexicaul, margins more or less ciliate from bulbous bases. *Inflorescence* of twin, digitate, fascicled or subpanicled simple or branched racemes or spikes; rhachis articulated, fragile. *Spikelets* laterally compressed, 2-nate, one sessile, the other pedicelled, similar or differing in sex mainly owing to reduction, or else solitary and sessile with or without an often very rudimentary pedicel. *Glumes* equal, chartaceous to coriaceous, rarely membranous; lower 2-keeled or rounded on the back and sides and not keeled, sometimes bearing rows of tubercles or spines on the margins; upper thinner, much compressed, keeled upwards, in all our species complicate-boat-shaped. *Lemmas* hyaline; lower empty, usually without palea; upper subentire with a dorsal or basal, more or less well-developed awn, rarely awnless, enclosing a bisexual floret, palea minute or 0. *Lodicules* 2. *Stamens* 2–3. *Grain* narrowly linear or fusiform; embryo half as long. *Pedicelled spikelet*, when present, usually ♂ and awnless.

Lower glume of sessile spikelets 2-keeled, margins inflexed, back nearly flat:—
  Glumes glabrous or nearly so; keels not winged:—
    Keels of lower glume of sessile spikelets tubercled or toothed; pedicelled spikelets more or less developed:—
      Lower glume of sessile spikelets ·2 in. or less long with pectinately toothed keels; joints of rhachis ·1–·12 in. long, ciliate:—
        Lower glume of sessile spikelets lanceolate ·18–·2 in. long, back smooth. Rootstock and lowest 1 or 2 sheaths tomentose; culms comparatively robust, up to 36 in. high; leaves

lanceolate to linear-lanceolate, ·8–3 in. long, ·12–·65 in. wide, glabrous; awns ·26–·42 in. long............1. *lanceolatus.*
Lower glume of sessile spikelets linear or narrowly lanceolate, ·2 in. long, nerves on back echinulate, rarely in the lowest spikelets smooth. Rootstock and sheaths not tomentose; culms up to 12 in. high; leaves linear, ·8–2·3 in. long, ·17–·5 in. wide, usually pubescent, rarely quite glabrous; awns ·3–·4 in. long ....2. *echinatus.*
Lower glume of sessile spikelets ·28 in. or more long, narrowly linear-lanceolate, keels with a double row of tubercles, gradually converted to spinules at the apex. Culms 4–10 in. high; leaves ovate to ovate-lanceolate, ·8–2·3 in. long, ·25–·6 in. wide, sparsely hairy; joints ·18 in. long, long-ciliate; awns ·8 in. long...................................3. *Meeboldii.*
Lower glume of sessile spikelets linear-lanceolate, subcoriaceous, ·2–·26 in. long, keels spinulose-hispid. Culms comparatively robust; leaves rigid, ovate to oblong-lanceolate, cuspidate, 2–3·5 in. long, ·5–1 in. wide, glabrous; joints ·16–·19 in. long, compressed, densely ciliate; pedicelled spikelet reduced to a pedicel; awn ·42–·48 in. long ....4. *depressus.*
Lower glume of sessile spikelets lanceolate, ·22 in. long, back densely villous, keels with narrow, densely ciliate wings. Culms 12 in. or more long; leaves linear-lanceolate, 1·2–2 in. long, ·3 in. wide, hairy; joints ·14 in. long, long white-ciliate, pedicelled spikelet fully developed; awn ·48 in. long..................5. *villosus.*
Lower glume of sessile spikelets compressed-convex, not keeled, margins not inflexed:—
Lower glume entire or minutely 2-toothed; no pedicelled spikelet:—
Paleas about half as long as the upper lemmas, ovate-lanceolate. Culms up to 2 ft. high; leaves linear-lanceolate, acuminate, 1·5–4 in. long, ·15–·6 in. wide, margins and midrib below ciliate; pedicels ·09 in. long, hairy on the back, devoid of spikelets; glumes of sessile spikelets minutely muriculate, lower ·2–·24 in. long, 5–7-nerved, nerves armed with spinescent tubercles in the upper half, upper longer, keeled, keel spinulose near apex .... 6. *rudis.*
Paleas 0:—
Joints subterete, very slender, ·07–·1 in. long, finely ciliate on one side only; pedicels 0. Culms very slender, 2–18 in. high; leaves linear to elliptic-lanceolate, ·4–2·3 in. long, ·07–·55 in. wide; lower glume ·1–·15 in. long, nerves minutely scaberulous; upper glume minutely puberulous, not ciliate; awns ·23–·4 in. long ....7. *Quartinianus.*

Joints plano-convex, slender, ·12–·18 in. long, glabrous; pedicels ·06–·14 in. long, linear, flat. Culms 10–20 in. high; leaves lanceolate to ovate, ·7–2·3 in. long, ·2–·7 in. wide; lower glume ·15 in. long, nerves hispid; upper glume hispid at apex, its margins ciliate; awns ·3–·5 in. long .... 8. *hispidus.*

Lower glume of sessile spikelets lanceolate, ·1–·13 in. long, minutely puberulous, 2-cuspidate. Culms very slender, straggling, up to 16 in. long; leaves linear-lanceolate to ovate, ·5–1·7 in. long, ·15–·47 in. wide, puberulous and often also sparsely hairy; joints very slender, subterete, ·03–·08 in. long, densely long-ciliate; pedicels ·03–·04 in. long flat, long-ciliate, spikelets fully developed; upper glume of sessile spikelets ·08–·09 in. long, with a mucro ·06 in. long; awns ·24–·4 in. long.................. 9. *lancifolius.*

1. ARTHRAXON LANCEOLATUS, Hochst.; F. B. I. vii. 143.
   Bellary District at Raman Drug; Nilgiri and Pulney Hills; 2,500–6,500 ft.
   Vern. *Tel.* Rai gaddi.
2. ARTHRAXON ECHINATUS, Hochst. *A. spathaceus*, Hook. f.; F. B. I. vii. 145.
   Cuddapah District (Wight, Gamble); Mysore State (Meebold); about 2,000 ft.
3. ARTHRAXON MEEBOLDII, Stapf.
   Mangalore (Meebold).
4. ARTHRAXON DEPRESSUS, Stapf ex C. E. C. Fischer in Kew Bull. 1933, 350.
   Mysore State at Agalatti (Meebold); 3,500 ft.
5. ARTHRAXON VILLOSUS, C. E. C. Fischer in Kew Bull. 1933, 350.
   Bababudan Hills (Bourne).
6. ARTHRAXON RUDIS, Hochst.; F. B. I. vii. 144.
   Mysore State (Meebold); 3,500 ft.
7. ARTHRAXON QUARTINIANUS, Nash. *A. ciliaris*, Beauv. a; F. B. I. vii. 146.
   W. Ghâts from Coorg to the Pulney Hills; 3,000–7,000 ft.; Mysore State; Calicut; Bolampatti Valley at 1,700 ft. (Fischer).
   Vern. *Kan.* Nela bidaru hullu.
8. ARTHRAXON HISPIDUS, Makino. *A. ciliaris*, Beauv. b; F. B. I. vii. 146.
   Mysore State at 2,000 ft. (Meebold); Malabar (Barber); Travancore (Mayuranathan).

9. Arthraxon lancifolius, Hochst. *A. microphyllus*, Hochst.; F. B. I. vii. 147.

Rampa Hills at 4,500 ft. (Narayanaswami); Bellary District at Raman Drug; Mysore State (Meebold); W. Coast.

23. Capillipedium, Stapf.

Annual or perennial herbs. *Leaves* flat. *Inflorescence* a rather delicate, usually much divided panicle; main rhachis and branches capillary; racemes 1–4, rarely up to 8-jointed; joints and pedicels slender, longitudinally grooved and translucent in the groove. *Spikelets* 2-nate, one sessile, the other pedicelled, similar in shape, differing in sex. *Sessile spikelets*: *Glumes* subequal, thinly chartaceous to membranous; lower 2-keeled with narrow, inflexed margins, keels usually bristle-ciliate; upper boat-shaped, more or less grooved on each side of the keel. *Lemmas* dissimilar; lower hyaline empty; upper reduced to the linear, hyaline base of a geniculate awn, containing a bisexual floret; palea absent. *Lodicules* 2. *Stamens* 3. *Grain* oblong, slightly dorsally compressed; embryo more than half as long. *Pedicelled spikelet* sometimes with only one 2-keeled glume, the second, if present, shorter or much reduced; one or both lemmas sometimes present, hyaline, awnless, sometimes containing a ♂ floret.

Culms stiff, erect, not or hardly decumbent below:—

Culms usually copiously branched, up to 6 ft. high, or even taller, almost woody; nodes glabrous or short-hairy; panicles usually large, lax; callus of sessile spikelets shortly bearded; lower glume ·08–·1 in. long, glabrous or minutely puberulous; awns ·36–·5 in. long; lower glume of pedicelled spikelets ·1–·16 in. long 1. *glaucopsis.*

Culms simple or sparingly branched, up to 4 ft. high, usually slender; nodes usually densely, often long bearded; panicles contracted, rarely somewhat lax; callus of sessile spikelets densely villous; lower glume ·1–·14 in. long, usually villous all over or only below the middle; sometimes only puberulous or quite glabrous, awns ·4–·9 in. long; lower glume of pedicelled spikelets ·14–·17 in. long 2. *Huegelii.*

Culms decumbent and often interlaced, copiously geniculately branched, weak, up to 3 ft. long; nodes shortly hairy; panicles 1–2 in. long, branches few; callus of sessile spikelets densely villous;

lower glume ·08–·12 in. long, glabrous or sparsely hairy below the middle; awns ·38–·62 in. long; lower glume of both spikelets equal 3. *filiculmis.*

1. CAPILLIPEDIUM GLAUCOPSIS, Stapf. *Andropogon assimilis*, Steud.; F. B. I. vii. 179.
   Ganjam (Gamble) and Godavari Districts; Coorg, Wynaad and Travancore; 300–2,000 ft.
2. CAPILLIPEDIUM HUEGELII, Stapf. *Andropogon Huegelii*, Hack. F. B. I. vii. 180. *A. Schmidii*, Hook. f.; F. B. I. vii. 180.
   W. Ghâts from the Bababudan Hills to Travancore; S. Kanara District; sea-level to 7,000 ft. Often aromatic.
3. CAPILLIPEDIUM FILICULMIS, Stapf. *Andropogon filiculmis*, Hook. f.; F. B. I. vii. 181.
   Mysore State at Agalatti (Meebold); S. Kanara and S. Malabar Districts.

24. Amphilophis, Nash

Perennial herbs. *Leaves* narrow, usually flat. *Inflorescence* of panicled digitate, spiciform, shortly peduncled racemes, usually with a short primary axis, rarely with secondary branches; rhachis of raceme many-jointed, disarticulating horizontally; joints and pedicels filiform, longitudinally grooved and translucent in the groove. *Spikelets* 2-nate, one sessile, the other pedicelled, similar in shape or the pedicelled reduced, differing in sex except the lowermost pair, which may be homogamous (♂ or empty). *Sessile spikelets* dorsally compressed, callus small, usually bearded. *Glumes* subequal, chartaceous or membranous; lower 2-keeled with inflexed margins; upper boat-shaped, acutely keeled. *Lemmas* dissimilar; lower hyaline, empty; upper reduced to the linear stipe of a geniculate awn, containing a bisexual floret; paleas 0 or minute. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, obtuse, slightly compressed; embryo about half as long. *Pedicelled spikelet* similar but awnless; one lemma often present containing a ♂ floret.

Primary axis of the inflorescence short, much overtopped by the racemes, branches undivided:—
Leaves mostly aggregated near the base, glabrous or hairy, 1–6 in. long, ·1–·15 in. wide. Culms often creeping at the base, up to 30 in.

long; racemes 1–10, 1–2·5 in. long; lower glumes usually with a median pit, rarely 2, on the back above the middle, but sometimes quite smooth, ·11–·14 in. long; awns ·36–·85 in. long.... 1. *pertusa.*

Leaves mostly cauline, elongate:—

Lower glumes devoid of pits:—

Culms stout, up to 5 ft. high, nodes hairy; leaves 3–24 in. long, ·15–·3 in. wide; racemes up to 6, 1–4 in. long; lower glume of sessile spikelets more or less long-hairy on the back below the middle, ·16–·2 in. long; awns ·65–1 in. long 2. *pseudoischaemum.*

Culms comparatively slender, up to 3 ft. high, nodes usually glabrous; leaves often involute, 4–14 in. long, ·15–·25 in. wide; racemes few to many, 1–4 in. long; lower glume of sessile spikelets glabrous, often dorsally longitudinally depressed, ·14–·17 in. long; awns ·5–·85 in. long.......... 3. *Foulkesii.*

Lower glumes usually pitted, at least in most of the spikelets:—

Lower glume of pedicelled spikelets 2–4-pitted, ·16–·2 in. long; that of sessile spikelets 1-pitted. Culms up to 3 ft. high; leaves 6–25 in. long, ·12–·3 in. wide; racemes 1–14, 1·5–3·5 in. long; awns ·46–·85 in. long.................... 4. *insculpta.*

Both lower glumes with 1 dorsal pit, seldom unpitted, ·14–·19 in. long. Culms often robust, up to 7 ft. high; leaves 4–24 in. long, ·12–·4 in. wide; racemes 8–20, sometimes more, flexuous, silky, 1·5–3 in. long; awns ·12–·2 in. long...... 5. *Kuntzeana.*

Primary axis up to 10 in. long, much longer than the racemes, stronger branches again branched. Culms 2–6 ft. high; leaves often setose at the base, 4–20 in. long, ·2–·42 in. wide; racemes numerous, up to 2·5 in. long; lower glume of sessile spikelet with or without a dorsal pit, ·12–·16 in. long, glabrous or somewhat hairy on the back below the middle, that of pedicelled spikelets unpitted; awns ·4–·75 in. long.. 6. *glabra.*

1. Amphilophis pertusa, Stapf. *Andropogon pertusus*, Willd.; F. B. I. vii. 173; S. I. G. figs. 152, 153.

In all Districts except the wettest localities; sea-level to 4,000 ft. Often in saline soils. A good fodder and hay. Vern. *Ur* Basana; *Tel.* Janu gaddi, Turri gaddi; *Tam.* Chinna-karai pullu.

2. Amphilophis pseudoischaemum, C. E. C. Fischer n. comb. *Andropogon pseudoischaemum*, Nees; F. B. I. vii. 172.

Deccan and Coromandel; 1,000–2,000 ft.

3. Amphilophis Foulkesii, C. E. C. Fischer n. comb. *Andropogon Foulkesii*, Hook. f.; F. B. I. vii. 174.
   Nilgiri, Pulney and Tinnevelly Hills; 6,000–8,000 ft.
4. Amphilophis insculpta, Stapf. *Andropogon pertusus*, Willd. var. *insculptus*, Hack.; F. B. I. vii. 174.
   W. Ghâts from the Bababudan to the Pulney Hills; 3,600–7,000 ft. Vern. *Kan.* Hennu ganjalu garikai hullu.
5. Amphilophis Kuntzeana, Haines. *Andropogon Kuntzeanus*, Hack.; F. B. I. vii. 175.
   Deccan; Carnatic; N. Coimbatore and Nilgiri Districts; sea-level to 2,000 ft. Uncommon.
6. Amphilophis glabra, Stapf. *Andropogon intermedius*, R. Br.; F. B. I. vii. 175. *A. montanus*, Roxb.; F. B. I. vii. 176.
   N. Circars from Ganjam and the Rampa Hills to the Nallamallais; up to 3,500 ft. Vern. *Ur.* Gonda bena.

25. Vetiveria, Thouars

Coarse, perennial herbs with stout rhizomes; culms more or less compressed below. *Leaves* narrow, conduplicate in bud, ultimately flat; lower leaf-sheaths much compressed. *Panicles* erect, composed of many-rayed whorls of slender, simple, rarely compound racemes; rhachis 3–many-jointed, fragile; joints and pedicels slender. *Spikelets* 2-nate, one sessile and one pedicelled, the pairs subsimilar but differing in sex. *Sessile spikelets* slightly laterally compressed. *Glumes* equal, coriaceous or chartaceous; lower rounded on the back, usually muticous, margins subinflexed; upper boat-shaped, keeled towards apex, mucronate or aristulate. *Lemmas* hyaline; lower 2-nerved, entire, empty; upper minutely 2-toothed, muticous, mucronate or with a more or less developed geniculate awn from the sinus, palea minute, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* oblong, slightly oblique at the apex. *Pedicelled spikelets* dorsally compressed, with much thinner glumes than those of the sessile spikelets, like the lemmas usually awnless, usually containing a ♂ floret.

Rootstock with spongy aromatic roots; culms tufted, stout, up to 6 ft. high or more; leaves distichous at the base, coriaceous, conduplicate at least below, 12–36 in. long, ·15–·4 in. wide, usually glabrous; panicle 6–15 in. long; joints and pedicels glabrous; sessile

spikelets with glabrous callus, lower glume muriculate, upper muriculate on the keel; upper lemma entire, muticous or mucromilate
1. *zizanoides.*

Rootstock horizontal, roots not spongy nor aromatic; culms comparatively slender, 1·5–5 ft. high; leaves chiefly subradical, rigidly herbaceous, 3–9 in. long, rarely up to 15 in., ·06–·15 in. wide, glabrous or more often sparsely, shortly hairy and distantly ciliolate; panicles 4–8 in. long, narrow; joints and pedicels with a basal tuft of hairs; sessile spikelets with a bearded callus; lower glume narrowly ensiform with a row of marginal tubercles enlarging upwards and becoming spinulose at the tip, upper shorter, 2-fid with a slender arista ·3–·5 in. long; upper lemma with a slender awn ·8 in. long.......2. *Lawsoni.*

1. VETIVERIA ZIZANOIDES, Nash. *Andropogon squarrosus* Hack. non Linn. f.; F. B. I. vii. 186: S. I. G. fig. 154.

In all Districts except on the W. Coast; sea-level to 3,000 ft. The Khas-khas or Cus-cus grass.

A good fodder when young. The aromatic roots are used for making the well-known khas-khas mats for cooling dwellings and for fans. An aromatic and medicinal oil is extracted from the roots. Vern. *Hind.* Khas-khas; *Tel.* Vatti-veru; *Tam.* Vettiver, Virkel, Viyal; *Mal.* Vettiver; *Kan.* Kadu karai, Dhappa sajjai hullu.

2. VETIVERIA LAWSONI, Blatter et McCann. *Andropogon Lawsoni*, Hook. f.; F. B. I. vii. 187.

Mysore State; Coimbatore and Nilgiri Districts; 1,400–3,000 ft.

Cattle are said to eat the leaves and reject the flowering culms. Vern. *Kan.* Karai hullu; Thoddu karai hullu.

26. Pseudosorghum, A. Camus

Annual herbs, decumbent below. Panicles contracted, dense; primary branchlets nearly always solitary, alternate, erect, branching from the base, lower secondary branchlets sometimes verticillate; racemes spiciform, dense, sessile or nearly so; rhachis fragile; joints and pedicels slender, hairy. *Spikelets* 2-nate, one sessile, the other pedicelled, differing only in sex. *Sessile spikelets* much imbricated: *Callus* short, bearded. *Glumes* subequal, chartaceous; lower 2-keeled; upper boat-shaped, 1-keeled. *Lemmas* hyaline; lower nearly as long as the glumes, sometimes

paleate, empty; upper narrow, shorter, cleft for half its length into 2 narrow lobes with a geniculate awn from the sinus, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Pedicelled spikelets* narrower than the sessile, often much reduced, sometimes only 1 glume left: *Glumes* membranous, narrow; lower 2-keeled; upper similar or boat-shaped and 1-keeled. *Lemmas*, when present, hyaline; lower the longer, empty or containing a ♂ floret.

PSEUDOSORGHUM FASCICULARE, A. Camus. *Andropogon fascicularis*, Roxb.; F. B. I. vii. 117.

Ganjam (Gamble), Godavari (Barber) and Coimbatore (Fischer) Districts; Palghat Hills (Beddome); Cochin State (Meebold); sea-level to 4,000 ft.

Culms up to 5 ft. high; leaves sometimes very short but usually long, up to 20 in. long and ·3 in. wide; panicles up to 5 in. long; racemes few or many and dense, 1·5–2 in. long; awns ·4–·6 in. long.

Vern. *Tel.* Konda-jeri.

27. Sorghum, Pers. sensu A. Camus

Annual or perennial, tall, sometimes woody. *Leaves* at first convolute, eventually flat. *Panicles* often large, with verticillate or scattered branches, usually lax in the wild species, frequently contracted or compacted in the cultivated ones; rhachis fragile or tough; divisions 1–few-jointed; joints and pedicels slender with ciliate edges. *Spikelets* 2-nate on the lateral nodes, one sessile, the other pedicelled or reduced to a pedicel, differing in shape and sex. *Sessile spikelets* more or less dorsally compressed or subglobose or ovate or elliptic: *Glumes* subequal, often coriaceous; lower 2-keeled at apex with narrowly inflexed margins, involute at base, apex erose or 3-toothed; upper shorter, convex, 1-keeled. *Lemmas* hyaline; lower as long as the glumes or nearly so, empty; upper oblong, 2-toothed or 2-fid, rarely entire, muticous or mucronate or awned from the sinus, paleas sometimes present, including a bisexual floret. *Lodicules* 2, rather large. *Stamens* 3, very rarely 2. *Styles* 2, free. *Grain* obovate or linear-oblong in wild species, globose in cultivated ones, free; embryo half as long or more. *Pedicelled spikelets* more or less reduced, lemmas when present ♂ or empty.

Rhachis of racemes fragile: sessile spikelets falling together with the contiguous joint and pedicel: spontaneous perennial plants:—

Primary branches of the panicle undivided, up to 4 in. long:—

Culms solitary, stout, 3–8 ft. high; nodes white-silky: leaves 8–21 in. long, ·15–·3 in. wide: panicle ultimately effuse, 4–10 in. long: racemes whorled; peduncles very slender: joints, pedicels and spikelets purplish- or reddish-villous: lower glume of sessile spikelets black and polished when ripe; upper lemma acuminate, truncate or 2-fid for up to ⅓ its length, muticous, aristate or with an awn up to ·56 in. long .... 1. *nitidum.*

Culms tufted, comparatively thin, 6–24 in. high; nodes glabrous; leaves 2–4 in. long, ·15–·6 in. wide; panicles narrow, up to 5 in. long: racemes few, alternate; peduncles rather stout: joints and pedicels densely creamy-villous: glumes of sessile spikelets very coriaceous, tomentose on the back: awns ·65 in. long 2. *Stapfii.*

Primary branches of the panicle branched, up to 10 in. long, panicles usually effuse, 9–17 in. long. Culms solitary, stout, often woody, 3–15 ft. high; nodes glabrous or nearly so; leaves 5–33 in. long, ·3–2·2 in. wide; glumes of sessile spikelets more or less hairy on the back; upper lemma cleft for ⅓ to ½ its length, with an awn ·43–·52 in. long, seldom entire and muticous.......... 3. *halepense.*

Rhachis of racemes tenaceous; sessile spikelets persistent; usually annual, cultivated plants........................ *Cultivated species.*

1. Sorghum nitidum, Pers. *Andropogon serratus,* Thunb.; F. B. I. vii. 185.

   In all Districts from Coorg to Travancore; 1,000–7,000 ft. Vern. *Kan.* Chikka narala hullu.

2. Sorghum Stapfii, C. E. C. Fischer n. comb. *Andropogon Stapfii,* Hook. f.; F. B. I. vii. 184.

   Palamkotta (Wight).

3. Sorghum halepense, Pers. *Andropogon halepensis,* Brot.; F. B. I. vii. 182.

   In all Districts, except on the W. Coast; sea-level to 7,000 ft. A good fodder and hay grass when mature; when young it is said to have sometimes had injurious and even fatal effects on animals eating it. Vern. *Tam.* Kadu-cholam; *Kan.* Kadu-kambu hullu.

Cultivated Species: Various species and races of Sorghum are ıltivated in all Districts. Hitherto these have been clubbed

under the name *Andropogon Sorghum*, Brot.; F. B. I. vii. 183. The Great Millet.

The cultivated Sorghums are under revision by Mr. J. D. Snowdon, and until the result of his work is published it would be inadvisable to attempt a classification. As far as is known at present the following five species with varieties and races are grown in India: *S. Roxburghii*, Stapf, *S. bicolor*, Moench, *S. Durra*, Stapf, *S. cernuum*, Host, *S. subglabrescens*, Schweinf. et Aschers. The vernacular names, which cannot at present be correlated with the different species, are: *Hind.* Juari, Bajra; *Ur.* Jonna; *Tel.* Jonna, Jonnalu; *Tam.* and *Mal.* Cholam; *Kan.* Jola; with racial names qualifying each.

The plants are of great economic importance as comestible grains and as a fodder, hay and thatch grasses.

28. Chrysopogon, Trin.

Usually perennial, erect herbs. *Leaves* narrow, flat or complicate. *Panicles* terminal, usually lax, branches whorled, rarely 2-nate or solitary, simple or divided at the base. *Spikelets* in threes at the ends of the branches, one sessile and 2 pedicelled, falling together from the thickened, oblique, rarely glabrous tips of the peduncles, rarely 2-nate in 2-jointed racemes and then 1 sessile and 1 pedicelled, the sessile falling with the contiguous joint and pedicel; pedicels (and joints when present) filiform. *Sessile spikelets* usually laterally compressed: *Glumes* subequal, coriaceous or chartaceous; lower complicate or involute, backs rounded or more or less 1-keeled; upper boat-shaped, more or less 1-keeled. *Lemmas* hyaline; lower empty; upper entire or 2-toothed, with a more or less perfect geniculate awn; palea small or 0, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* linear, laterally compressed; embryo half as long. *Pedicelled spikelets* dorsally compressed: *Glumes* subequal, thin, sometimes awned. *Lemmas* hyaline, muticous, usually enclosing a ♂ floret.

Pedicels half as long as the sessile spikelets or longer:—
Pedicels glabrous. Rootstock woody, creeping; culms 5–20 in. high; leaves mostly basal, ·8–6 in. long, ·1–·25 in. wide, glabrous, panicles 1·5–3·5 in. long, narrow, branches ascending sharply;

glumes of sessile spikelets ·14–·17 in. long, upper mucronate; awns ·16–·24 in. long; glumes of pedicelled spikelets ·14–·24 in. long, muticous ....1. *aciculatus.*

Pedicels rufous-hairy; leaves usually puberulous:—

Lower glume, at least, of pedicelled spikelets aristate:—

Leaves conspicuously distichous, sheaths below much compressed and acutely keeled, often beset with bristles from bulbous bases, 3–21 in. long, ·1–·45 in. wide, often complicate, base semi-amplexicaul. Culms stout, 20–52 in. high; panicles 5–9 in. long, narrow, branches ascending; glumes of sessile spikelets ·2–·22 in. long, awn of upper ·5–·85 in. long; awn of lemma 1·7–2·8 in. long; glumes of pedicelled spikelets ·33–·35 in. long, lower with one awn ·33–·5 in. long, upper muticous or with an arista ·22 in. long.......................2. *asper.*

Leaves not conspicuously distichous, not bristly, not semi-amplexicaul:—

Culms robust, up to 6 ft. high, lower nodes often bearded; leaves 14–20 in. long, ·4–·65 in. wide; sparsely pilose at base, finely acuminate, sheaths not keeled; panicles 7–13 in. long, pyramidal, branches ultimately horizontal; sessile spikelet with a callus ·04–·07 in. long, glumes ·21–·28 in. long, upper with an awn ·32–·46 in. long; awn of lemma 1·3–1·7 in. long; glumes of pedicelled spikelets ·34–·42 in. long, lower with an awn ·24–·42 in. long, upper muticous 3. *verticillatus.*

Culms comparatively slender, up to 3 ft. high, nodes glabrous; leaves 1·7–9·5 in. long, ·1–·3 in. wide, usually abruptly acute, pubescent, rarely glabrous, lower sheaths somewhat compressed and keeled; panicles 5–7 in. long, branches ascending; sessile spikelets with a callus ·09–·2 in. long, glumes ·18–·23 in. long, awn of upper ·36–·66 in. long, awn of lemma 1·5–2·4 in. long; glumes of pedicelled spikelets ·26–·36 in. long, awn of lower ·25–·63 in. long, upper finely acuminate, muticous or mucronate.........................4. *orientalis.*

Glumes of pedicelled spikelets ·37–·53 in. long, acuminate or caudate-acuminate, not aristate or awned. Culms 7–36 in. high; leaves 8–14 in. long, ·15–·6 in. wide, complicate, rather stiff, often densely imbricate at the base; panicles 3–6 in. long, branches erect or spreading; sessile spikelets with a callus ·04–·06 in. long, glumes ·23–·26 in. long, upper mucronulate or with an arista up to ·26 in. long, awn of lemma 1·25–1·45 in. long 5. *zeylanicus.*

Pedicels less than half as long as the sessile spikelets :—

Leaves glabrous :—

Leaves not distichous :—

Upper glume of sessile spikelets more or less ciliate, usually rufous-hairy on the keel; glumes of pedicelled spikelets usually pubescent or hispid, lower aristate. Rootstock often creeping; culms 9–38 in. high; leaves 1·8–8 in. long, ·05–·1 in. wide, usually rigid, sometimes ciliate from bulbous bases; panicles 1·5–3 in. long, branches usually spreading; glumes of sessile spikelets ·12–·22 in. long, upper with an arista ·26–·33 in. long, awns of lemmas ·92–1·1 in. long; glumes of pedicelled spikelets ·13–·22 in. long, lower with an arista ·14–·22 in. long (in variety *robusta* all parts larger) .... 6. *montanus.*

Upper glume of sessile spikelets glabrous; glumes of pedicelled spikelets muticous, glabrous. Culms 6 ft. or more high; leaves 6–36 in. long, ·2–·3 in. wide, sheaths silky at base, margins often silky-ciliate; panicles 4–6 in. long, branches spreading; glumes of sessile spikelets ·17–·22 in. long, upper with arista ·12–·3 in. long, awn of lemmas ·76–1·2 in. long; glumes of pedicelled spikelets ·17–·18 in. long .... 7. *Hackelii.*

Leaves conspicuously distichous, 4·5–8·2 in. long, ·15–·2 in. wide. Rootstock woody, creeping; culms up to 3 ft. high; panicles 3–6 in. long, branches ascending; hairs of pedicels and callus pale straw-coloured, latter slender, glabrous in upper half; glumes of sessile spikelets ·22–·24 in. long, upper mucronate; awn of lemma ·47–·56 in. long; glumes of pedicelled spikelets ·22 in. long, muticous .... 8. *polyphyllus.*

Leaf-sheaths and blades puberulous, blades 5–9 in. long, ·1–·42 in. wide. Culms 1–2 ft. high; panicles 2–3 in. long, branches spreading with sparsely, shortly, white-ciliate apices; glumes of sessile spikelets ·21–·25 in. long, pale, upper more or less rufous-hairy, with an arista ·16–·28 in. long; awn of lemmas 1·2 in. long; glumes of pedicelled spikelets ·15–·2 in. long, muticous, lower rufous-hispid in lower half.................................... 9. *velutinus.*

1. CHRYSOPOGON ACICULATUS, Trin. *Andropogon aciculatus*, Retz.; F. B. I. vii. 188.

In all Districts; sea-level to 2,000 ft. The Love-grass. Eaten by cattle before flowering. Vern. *Tel.* Putthi gaddi.

2. CHRYSOPOGON ASPER, Heyne ex Hook f. *Andropogon asper*, Heyne ex Hook. f.; F. B. I. vii. 189; S. I. G. figs. 155, 156.

Cuddapah District; Horsleykonda; Kambakkam Hills; Nilgiri Hills at Naduvattam; 1,000–6,000 ft.

Doubtfully distinct from *C. orientalis*, A. Camus.

3. CHRYSOPOGON VERTICILLATUS, Trin. *Andropogon verticillatus*, Roxb.; F. B. I. vii. 189.

Rampa Hills at 2,000–3,000 ft. (Narayanaswami); Godavari District (Bourne).

4. CHRYSOPOGON ORIENTALIS, A. Camus. *Andropogon Wightianus*, Steud.; F. B. I. vii. 191; S. I. G. fig. 157.

In most Districts from Cuddapah southwards; sea-level to 7,000 ft.

A conspicuous grass owing to the bright red or purple glumes of the pedicelled spikelets.

5. CHRYSOPOGON ZEYLANDICUS, Thw. *Andropogon zeylanicus*, Nees; F. B. I. vii. 192.

W. Ghâts; 4,000–8,000 ft.

The glumes of the pedicelled spikelets are purple and green. Vern. *Kan.* Badi hullu.

6. CHRYSOPOGON MONTANUS, Trin. *Andropogon monticola*, Schult.; F. B. I. vii. 192; S. I. G. fig. 158.

In all Districts except the W. Coast; sea-level to 3,000 ft. Often on laterite soil.

A good fodder grass. Vern. *Tel.* Gurra batto kelu.

Var. *robustus*, Hook. f.; F. B. I. vii. 193.

Culms stouter and taller; all parts larger.

Godavari, Kistna, Guntur, Bellary and Coimbatore Districts. Vern. *Kan.* Chello san kanni.

7. CHRYSOPOGON HACKELII, C. E. C. Fischer n. comb. *Andropogon Hackelii*, Hook. f.; F. B. I. vii. 194.

W. Ghâts from Coorg to Travancore; 2,000–5,000 ft.

8. CHRYSOPOGON POLYPHYLLUS, Blatter et McCann. *Andropogon polyphyllus*, Hack. ex Hook. f.; F. B. I. vii. 194.

Godavari District: Devypatnam (Gamble) and Kolur Gorge (Bourne).

9. CHRYSOPOGON VELUTINUS, Arn. ex Hook. f. *Andropogon velutinus*, Hook. f.; F. B. I. vii. 194.

Cuddapah District (Wight).

29. Dichanthium, Willemet

Perennial, seldom annual, tufted herbs. *Leaves* narrow. *Inflorescence* of subdigitate, rarely solitary, subpanicled or racemosely arranged, short-peduncled, spiciform racemes; joints and pedicels slender. *Spikelets* 2-nate, one sessile, the other pedicelled, similar in shape and size, differing in sex, the lowermost 1–2 pairs of the raceme usually homogamous and ♂ or empty. *Sessile spikelets* dorsally compressed: *Glumes* equal, thinly chartaceous; lower usually rounded at the apex, 2-keeled, at least in the upper half; upper boat-shaped, acutely 1-keeled. *Lemmas* usually without palea, sometimes a minute upper one present; lower hyaline empty; upper reduced to a firm pale stipe hyaline at base, passing into a geniculate awn, the stipe rarely very narrowly margined and finely 2-fid at apex; its floret bisexual. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, obtuse, slightly compressed. *Pedicelled spikelets* awnless; lower lemma present or not, if present sometimes empty, sometimes containing a ♂ floret.

Culms leafy; leaves glabrous or sparsely hairy; glumes ·18 in. or less long; upper lemma of sessile spikelets reduced to an awn:—
  Stem below inflorescence and peduncles of spikes glabrous:—
    Culm nodes patently hairy, rarely glabrous; culms up to 40 in. high; leaves 2–11 in. long, ·1–·2 in. wide; racemes 2–9, 1–3 in. long; glumes ·1–·15 in. long, lower of sessile spikelets elliptic, apex rounded or narrowed and obtuse; awns ·6–1 in. long
    1. *annulatum.*
    Nodes usually glabrous, seldom somewhat hairy, rarely patently so; racemes solitary or sometimes 2-nate; lower glume of sessile spikelets obovate or obovate-oblong:—
      Culms usually erect from a geniculate base, 10–36 in. high, occasionally dwarf and 3–4 in. high; leaves 1·5–4·5 in. long, ·05–·17 in. wide; racemes 1·4–2·2 in. long; glumes ·12–·15 in. long, apex rounded or subacute; awns ·6–·9 in. long
      2. *caricosum.*
      Culms creeping, apical 2–6 in. erect; leaves ·9–2 in. long, ·05–·1 in. wide; racemes ·8–1 in. long; glumes ·16 in. long, apex rounded; awns ·75 in. long................3. *pallidum.*
  Stem below the inflorescence usually and peduncles always softly, patently hairy; culms 1–4 ft. high; nodes usually patently hairy,

sometimes glabrous; leaves 3–12 in. long, ·1–·2 in. wide; racemes 1–6, 2–3·5 in. long; glumes ·13–·18 in. long, lower of sessile spikelets elliptic-oblong to broadly obovate, apex rounded or narrowed and obtuse; awns ·7–1·1 in. long..........4. *nodosum.*

Culms naked or with 1–2 reduced leaves, 20–40 in. high, slender: leaves mostly basal, 7–10 in. long, ·1 in. wide, the cauline up to 4·5 in. long, softly hairy on both sides, often involute; racemes usually solitary, sometimes 2–3, 2–2·2 in. long; glumes ·26–·4 in. long, lower of sessile spikelets narrowly elliptic-oblong to -lanceolate, acute or obtuse, up to ·36 in. long; awns ·9–1·2 in. long, their bases with a narrow hyaline margin cleft for about ⅓ its length into 2 capillary lobes ....5. *polyptychum.*

1. Dichanthium annulatum, Stapf. *Andropogon annulatus*, Forsk.; F. B. I. vii. 196; S. I. G. figs. 160, 161.

   In all the Eastern and Central Districts; at low elevations.

   A fair fodder.

2. Dichanthium caricosum, A. Camus. *Andropogon caricosus*, Linn.; F. B. I. vii. 196; S. I. G. fig. 159.

   In all Districts except the W. Coast; near sea-level to 3,000 ft.

   A fair fodder. Vern. *Kan.* Urukun hullu.

3. Dichanthium pallidum, Stapf MS. n. comb. *Apocópis pallida*, Hook. f.; F. B. I. vii. 143.

   Nilgiri Hills (Foulkes).

   This may be an impoverished form of the last species.

4. Dichanthium nodosum, Willem. *Andropogon caricosus*, Linn. var. *mollicomus*, Hack.; F. B. I. vii. 196.

   Mysore State; Godavari, Bellary, Salem and Coimbatore Districts; 1,000–3,000 ft.

5. Dichanthium polyptychum, A. Camus. *Andropogon polyptychus*, Steud.; F. B. I. vii. 198.

   Nilgiri and Pulney Hills (Bourne); 6,000–7,000 ft.

30. Heteropogon, Pers.

Annual or perennial usually branched herbs; branches mostly flowering and gathered into spatheate panicles. *Leaves* narrow, flat. *Racemes* spiciform, usually solitary, terminating the culms

or their sometimes fascicled branches; spikelets 2-nate, one sessile, the other pedicelled, the 1–several lower pairs alike, ♂ or empty, the upper pairs differing in sex and strikingly in shape; rhachis many-jointed, not or tardily disarticulating between the homogamous pairs of spikelets, fragile between the heterogamous. *Fertile sessile spikelets* terete or subterete. *Callus* often pungent, densely bearded upwards. *Glumes* equal, coriaceous or chartaceous, obtuse. *Lemmas* hyaline; lower empty; upper very slender, cartilaginous at apex and passing into a usually stout, geniculate awn; palea small or 0, enclosed floret ♀ or bisexual. *Lodicules* 2, large to minute. *Stamens* 3, or rudimentary or 0. *Grain* sublinear, terete; embryo slightly more than half as long. *Lower sessile* and *pedicelled spikelets* dorsally compressed, often twisted, imbricate: *Glumes* dissimilar; lower 2-keeled, usually winged upwards on one or both keels. *Lemmas* hyaline, often more or less reduced or suppressed, with or without 3 stamens.

Joints and pedicels glabrous; lower glume of fertile spikelets tightly involute, brown-hispid:—

Culms usually tall, comparatively stout; leaves glabrous or more or less setose from tubercles at the base; upper glume of fertile spikelets deeply grooved on both sides of the midrib:—

Leaves basal or basal and cauline, not strikingly distichous, very variable, 2–17 in. long, ·1–·4 in. wide. Culms 6–45 in. high; racemes 1–2·5 in. long; fertile spikelets with a callus ·07–·11 in. long, densely rufous-hairy; glumes ·15–·22 in. long; awns 2–3·5 in. long; lower glume of other spikelets ·23–·31 in. long, glabrous or more or less densely setose from tubercles, upper glume slightly longer, glabrous or with a few apical setae from tubercles .... 1. *contortus.*

Leaves from the middle of the culm, strikingly distichous, rigid, complicate, usually curved, 1–3 in. long, ·1–·13 in. wide. Culms 15–18 in. high, sheathed below; glumes of fertile spikelets ·24–·27 in. long; awns ·21–·24 in. long; glumes of other spikelets ·36–·4 in. long, subequal, glabrous ...... *contortus* var. *discticlius.*

Culms slender, 6–9 in. high; leaves 1–2·5 in. long, ·05 in. wide, glabrous or puberulous, ciliate at base; racemes ·5–1·5 in. long; fertile spikelets with a callus ·09–1 in. long, rufous-hairy on one side, glumes ·22–·23 in. long, upper not channelled, awns 1·6 in. long; glumes of other spikelets ·28 in. long, glabrous

2. *polystachyos.*

Joints and pedicels whitish hairy; lower glume of fertile spikelets not tightly involute:—

Leaves flat, ·5–2·6 in. long, ·12–·22 in. wide, hirsute, margins thickened. Culms slender, almost capillary, 2–12 in. high; racemes sometimes 2-nate, ·5–1·5 in. long; lower glume of fertile spikelets ·13–·16 in. long, oblong, convex, pale silky-hairy at least below the middle, upper boat-shaped, hardly keeled, glabrous; awns 1–1·6 in. long, glabrous in basal half; glumes of other spikelets ·14–·18 in. long, lower elliptic-oblong, truncate or 3-lobulate, 2-keeled, keels narrowly winged at apex........................... 3. *oliganthus.*

Leaves tightly involute, filiform, 3–8 in. long, glabrous. Culms wiry, 16 or more in. high; racemes 2–2·5 in. long; glumes of fertile spikelets ·23–·26 in. long, glabrous, lower narrowly linear-lanceolate, 2-toothed, 2-keeled at apex, with a deep median channel below the middle, glabrous, upper narrowly boat-shaped, not keeled, arista ·13–·15 in. long, slender, hairy below the middle; glumes of other spikelets ·31–·34 in. long, narrowly lanceolate, acuminate, 2-keeled, glabrous .... 4. *bellariensis.*

1. HETEROPOGON CONTORTUS, Beauv. ex Roem. et Schult. *Andropogon contortus*, Linn.; F. B. I. vii. 199; S. I. G. figs. 162, 163.

In all Districts; sea-level to 7,500 ft.

All the awns of a raceme often twisted about each other. A variable and very common, gregarious and very troublesome grass owing to the sharp, barbed callus and the hygroscopic awns which cause the fruit to adhere to and penetrate into the clothing of man and the hairs of animals. The Spear-grass.

A good fodder and suitable for hay-making, but when in fruit the latter should first be separated. Useful for thatching. Vern. *Hind.* Kher; *Ur.* Sinkolo; *Tel.* Eddi gaddi, Kaseri gaddi; Dubba gasari gaddi, Yerragoyi; *Tam.* Oosi pullu, Karunsi pullu, Pani pullu; *Kan.* Kari vunugada hullu, Sunkari hullu.

Var. *distichus*, C. E. C. Fischer n. var.

Anamallais at 3,500 ft. (Barber); Kodaikanal, 6,000–7,000 ft. (Bourne).

2. HETEROPOGON POLYSTACHYOS, Schult. *Andropogon polystachyos*, Roxb.; F. B. I. vii. 202.

Without precise locality (Wight).

3. Heteropogon oliganthus, Blatter et McCann. *Andropogon oliganthus*, Hochst.; F. B. I. vii. 201.
   W. Ghâts from Kudrai Mukh to Travancore; 3,000–8,000 ft.

4. Heteropogon bellariensis, C. E. C. Fischer n. comb. *Andropogon bellariensis*, Hack.; F. B. I. vii. 201.
   Anantapur District on Gooty Fort Hill (Campbell, Wight).

31. **Themeda**, Forsk.

Coarse annual or perennial herbs. *Leaves* narrow. *Inflorescence* terminating the culms and their upper branches in short solitary racemes subtended by spathes, crowded in paniculate, often glomerate fascicles; rhachis terete, tough or tardily disarticulating and glabrous between the homogeneous pairs of spikelets, readily disarticulating above them. *Spikelets* 2-nate, the terminal group 3-nate; 2 lowest pairs persistent, alike, ♂ or empty, sessile or subsessile, closely approximate to form a quasi involucre, the following pairs differing in sex and conspicuously in shape, one sessile, the other on a jointed pedicel, and falling with the upper part of the pedicel. *Involucral and pedicelled spikelets* similar, the latter narrower, much dorsally compressed, awnless: *Glumes* usually 2; lower 2-keeled, one or both keels sometimes scariously winged; upper occasionally suppressed. *Lemmas* hyaline; upper often suppressed, both or either with or without a ♂ floret. *Sessile spikelets* above the involucral terete: *Callus* usually acute to pungent, so densely bearded as to conceal more or less the adjacent joint and pedicel bases. *Glumes* equal, coriaceous except the submembranous tips; lower tightly involute, without keel, sometimes grooved down the middle; upper with a deep longitudinal groove on each side, firm between the grooves, margins thin. *Lemmas* dissimilar; lower hyaline, epaleate, empty; upper stipitiform, base hyaline, cartilaginous upwards and passing into a stout geniculate awn, or hyaline throughout and awnless or passing into a more or less reduced awn, paleate or not, containing a bisexual floret. *Lodicules* 2, rather large. *Stamens* 3. *Styles* 2. *Grain* linear-obovate, subterete, grooved on the front; embryo about half as long.

Involucral spikelets all on the same level; only one bisexual spikelet in the raceme:—

Branching strict; clusters of inflorescence very numerous in numerous fascicles:—

Perennial, erect; culms robust, up to 10 ft. high; leaves 10–20 in. long, ·1–·55 in. wide; clusters in globose or fan-shaped, drooping fascicles; lower glumes of involucral spikelets ·23–·42 in. long, glabrous or more or less setose from tubercles; lower glume of bisexual spikelets ·18–·27 in. long, glabrous, pubescent or rarely densely silky, sometimes muriculate, apex usually hispid; awns ·6–2·5 in. long........................1. *triandra.*

Annual, erect or more often geniculately ascending and scrambling; culms slender, up to 6 ft. long; leaves up to 12 in. long and ·25 in. wide; clusters usually narrow, erect or suberect; lower glumes of involucral spikelets ·18–·2 in. long, margins in upper half beset with stiff bristles from large tubercles; lower glumes of bisexual spikelets ·16–·17 in. long, puberulous; awns 1·3–1·5 in. long..............................2. *quadrivalvis.*

Branching very effuse; clusters few in few, small, superposed fascicles on filiform branches; leaves on the main culms up to 14 in. long and ·3 in. wide, tips filiform, upper leaves 3–4 in. long, filiform; lower glumes of involucral spikelets ·26–·27 in. long, glabrous except for a very few bristles from tubercles near the apex; lower glumes of bisexual spikelets ·18 in. long, glabrous and shining below, hispidulous at apex; awns 1–1·7 in. long..........3. *laxa.*

Involucral spikelets in superposed pairs; often 2 bisexual spikelets in the raceme:—

Panicle racemiform; lower glumes of bisexual spikelets ·12–·14 in. long, back longitudinally channelled. Culms usually slender, up to 4 ft. high, leafy, not clothed at base with leaf-sheaths; leaves 3–20 in. long, ·1–·55 in. wide; spathules usually finely setose from large tubercles; lower glumes of involucral spikelets ·26–·34 in. long; setose from minute tubercles; awns ·8–1·3 in. long
4. *tremula.*

Panicle decompound, thyrsiform; lower glumes of bisexual spikelets ·14–·18 in. long, not channelled. Culms robust, up to 10 ft. high, clothed at the base with broad, coriaceous, equitant leaf-sheaths; leaves up to 4 ft. long and ·33 in. wide; spathules slender, glabrous; lower glumes of involucral spikelets ·17–·24 in. long, glabrous, rarely setose from minute tubercles, apex hispidulous; awns ·6–·9 in. long..................................5. *cymbaria.*

1. THEMEDA TRIANDRA, Forsk. *Anthistiria imberbis*, Retz.; F. B. I. vii. 211.

In all Districts; sea-level to 7,000 ft.

Very variable, especially in indumentum. Eaten by cattle only when young. Vern. *Tam.* Erigai thattu pullu; *Kan.* Bettanchi hullu, Thodda anji hullu, Gondamanchi hullu.

2. THEMEDA QUADRIVALVIS, O. Ktz. *Anthistiria ciliata*, Linn. f.; F. B. I. vii. 213.

Ganjam, Kurnool, Bellary, Coimbatore and Tinnevelly Districts; Coorg, Mysore State. Ver. *Kan.* Guntu nalai hullu.

3. THEMEDA LAXA, Stapf ex Haines. *Anthistiria laxa*, Anderss.; F. B. I. vii. 213.

Rampa (Narayanaswami) and Vizagapatam Districts. (K. Ranga Achariyar), 2,500 ft.

4. THEMEDA TREMULA, Hack. *Anthistiria tremula*, Nees; F. B. I. vii. 214; S. I. G. fig. 165.

Hills from Coorg to Travancore; S. Kanara District; near sea-level to 7,000 ft.

5. THEMEDA CYMBARIA, Hack. *Anthistiria cymbaria*, Roxb.; F. B. I. vii. 215.

W. Ghâts; 1,000–7,000 ft. Vern. *Tam.* Noshia palai pullu; *Kan.* Balai hullu.

32. Iseilema, Andersson

Annual or perennial; culms compressed, at least at base. *Leaves* narrow with compressed, keeled sheaths. *Panicles* with usually fascicled branches interspersed with spathe-like bracts. *Racemes* fascicled, each in the axil of a complicate spathe with scarious margins. *Spikelets* lanceolate, the four basal whorled to form a quasi involucre as in *Themeda*, but all pedicelled; rhachis short, bearing one sessile and two pedicelled spikelets, or sometimes 2-jointed and then the lower with one sessile and one pedicelled spikelet, disarticulating from the peduncle immediately below the involucral spikelets. *Involucral and upper pedicelled spikelets* similar, the latter usually narrower and with longer pedicels, sometimes much reduced or

represented by the pedicel alone: *Glumes* membranous, subequal, more or less 2-keeled, usually strongly nerved. *Lemmas* hyaline, usually only the lower present, epaleate, containing a ♂ floret. *Sessile spikelets* with a very short, more or less bearded callus: *Glumes* subequal, coriaceous or chartaceous; lower lanceolate, truncate, emarginate or 2-toothed; upper more or less boat-shaped, acute. *Lemmas* dissimilar; lower short, hyaline, epaleate, empty; upper a hyaline stipe passing into a geniculate awn, subtending a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, dorsally compressed; embryo half as long.

Pedicels of involucral spikelets longer than broad, glabrous; glumes membranous; glumes of sessile spikelets lanceolate, glabrous on the back; upper pedicels slender, ·05–·1 in. long, sparsely hairy, their spikelets like the involucral:—

Spathes very narrow, rarely without minute tubercles on the keel and margins; peduncles very slender, ·28–·5 in. long, often much exserted, hispidulous upwards, minutely tubercular at apex. Culms 4–36 in. high; leaves 1·2–6 in. long, ·05–·1 in. wide; pedicelled spikelets ·14 in. long; glumes of sessile spikelets ·11–·12 in. long; awns ·4 in. long.................................1. *prostratum.*

Spathes comparatively broad, devoid of tubercles; peduncles ·08–·1 in. long, not exserted, devoid of tubercles. Culms 10–40 in. high; leaves 2-8 in. long, ·05–·15 in. wide; pedicelled spikelets ·17–·21 in. long; glumes of sessile spikelets ·14–·2 in. long; awns ·45–·5 in. long.................................2. *laxum.*

Pedicels of involucral spikelets as broad at apex as long, sides and base densely bearded; glumes coriaceous, ·23–·27 in. long, longitudinally depressed on each side of midrib. Culms 3–30 in. high; leaves 1–4·5 in. long, ·07–·18 in. wide; spathes usually glabrous, sometimes sparsely ciliate from rather large tubercles; glumes of sessile spikelets beaked, the beak 2-keeled, lower ·22–·24 in. long, back more or less pubescent, upper slightly shorter, more or less 1-keeled; awns ·54 in. long; upper pedicels ·12–·15 in. long, capillary, glabrous, bearing 1 or 2 much reduced glumes or none..............3. *anthephoroides.*

1. Iseilema prostratum, Anderss. *I. Wightii*, Anderss.; F. B. I. vii. 218.

Northern and Eastern Districts; Nilgiri and Coimbatore Districts; at low elevations in the drier parts.

An excellent fodder.

2. Iseilema laxum, Hack.; F. B. I. vii. 218; S. I. G. figs. 166–168.

In all Eastern and Central Districts from Ganjam to S. Arcot; Mysore State; sea-level to 2,500 ft.

An excellent fodder. Often confused with the previous species. Vern. *Tel.* Erra chengali gaddi; *Tam.* Tenga nari pillu.

3. Iseilema anthephoroides, Hack.; F. B. I. vii. 219; S. I. G. figs. 169, 170.

In the coastal Districts from Ganjam to Nellore; Bellary and Cuddapah Districts; sea-level to 1,000 ft.

33. Pseudanthistiria, Hook. f.

Annual herbs. *Leaves* narrow. *Panicles* leafy; branches slender, each terminating in a subumbellate fascicle of racemes subtended by a spathe-like bract. *Racemes* subtended by a complicate, acuminate or caudate, keeled spathe, resembling those of *Themeda*, but lacking the involucral spikelets, 2-jointed, the basal with one sessile and one pedicelled spikelet, the upper with one sessile and 2 pedicelled. *Sessile spikelets* with a short, short-bearded callus: *Glumes* subequal; lower chartaceous, slightly narrowed upwards, truncate, margins narrowly inflexed in upper part, broadly involute below; upper membranous, lanceolate acute or obtuse. *Lemmas* dissimilar; lower small, quadrate, empty; upper stipitiform, hyaline below, hardening upwards into a fine geniculate awn, subtending a bisexual floret. *Lodicules* 2, rather large. *Stamens* 3. *Grain* small. *Pedicelled spikelets* with slender pedicels $\frac{1}{3}$ as long: *Glumes* subequal, membranous. *Lemmas* 0, or sometimes one present. *Lodicules* and *stamens* as in the sessile spikelet.

Leaves tapering from base to apex, more or less hairy from tubercles on both sides; primary nerves 3–4 on each side of the midrib distinct from the finer secondaries; peduncles ·04 in. long, pubescent; back of lower glume of sessile spikelets not sulcate; lower glume of pedicelled spikelets usually sparsely setose at apex:—

Spathes ·25–·3 in. long, margins setose, usually from minute tubercles; lower glume of sessile spikelets nerveless or nerves 2 at the apex, ·1–·11 in. long. Culms erect, up to 2 ft. high; leaves 1·5–6 in. long, ·06–·15 in. wide, base slightly narrowed; awns ·6–·76 in. long; lower glume of pedicelled spikelets ·1–·12 in. long 1. *heteroclita.*

Spathes ·32–·8 in. long, margins only or most of the face in lower half bristly from rather large, sometimes blackish tubercles; lower glume of sessile spikelets ·12–·22 in. long, 7-nerved. Culms erect, up to 3 ft. high; leaves 3–7·5 in. long, ·18–·3 in. wide, base rounded; awns ·9–1·2 in. long; lower glume of pedicelled spikelets ·14–·22 in. long..2. *hispida.*

Leaves widest near the middle, glabrous, primary and secondary nerves usually indistinguishable, ·9–2·4 in. long, ·1–·3 in. wide. Culms erect from decumbent, rooting bases, slender, up to 18 in. high: spathes ·4–·52 in. long, margins finely ciliate from minute tubercles; peduncles ·05–·12 in. long, hairy; lower glume of sessile spikelets ·14–·18 in. long, 7-nerved, back slightly sulcate on each side of the midrib: awns ·75–1 in. long; lower glume of pedicelled spikelets ·2–·24 in. long, not setose ....3. *umbellata.*

1. PSEUDANTHISTIRIA HETEROCLITA, Hook. f.; F. B. I. vii. 219.
   S. Kanara and S. Malabar Districts; near the coast.
2. PSEUDANTHISTIRIA HISPIDA, Hook. f.; F. B. I. vii. 219.
   Mysore State; S. Kanara; sea-level to 4,000 ft.
3. PSEUDANTHISTIRIA UMBELLATA, Hook. f.; F. B. I. vii. 220.
   Godavari District; W. Coast and Ghâts, from Coorg southwards; sea-level to 4,000 ft.

34. Apluda, Linn.

Annual or perennial, leafy herbs, often geniculate and rooting from the nodes. *Leaves* flat, sometimes petioled. *Panicles* compound, leafy; branchlets clustered, clusters subtended by a spathe. *Spikelets* in threes at the tips of the branchlets, embraced by a boat-shaped bract, 1 sessile and 2 pedicelled, all similar in shape, muticous or the sessile awned, alike in sex or more often the pedicelled ♂ only; the whole falling together with the bulbous basal joint, or else the pedicelled spikelet when fertile disarticulating separately; the terminal spikelet small or almost suppressed, on a broad, flat, glume-like pedicel. *Glumes* equal; lower convolute, margins not or very narrowly inflexed; upper keeled. *Lemmas* hyaline, paleate; lower entire muticous, usually containing a ♂ floret; upper deeply 2-fid, and geniculately awned from the sinus or entire or nearly so and muticous, containing a bisexual floret, or in the pedicelled spikelets with a ♂ floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, slightly laterally compressed.

Upper lemma of sessile spikelets 2-lobed for half its length or more; awn ·26–·66 in. long. Culms 1–10 ft. high; leaves 2·5–15·5 in. long, ·1–·65 in. wide, narrowed at the base and often with a petiole up to 1·5 in. long; bracts ·16–·34 in. long, aristate; basal joint small and hemispheric or up to ·16 in. long and turbinate or cylindric; lower glume of sessile spikelet ·12–·31 in. long, margins narrowly winged above the middle ....1. *aristata.*

Upper lemma of sessile spikelet entire or very shortly 2-lobed, awnless. Otherwise as in the last species, but more slender, usually smaller in all its parts and more glabrous ....2. *mutica.*

1. APLUDA ARISTATA, Linn. *A. varia*, Hack. subsp. *aristata*, Hack.; F. B. I. vii. 150; S. I. G. figs. 142, 143.
   In all Districts; sea-level to 7,000 ft.
   Common, very variable in the dimensions of all its parts and in indumentum. Often scrambling over bushes.
   A fairly good fodder, readily eaten by cattle when young. Vern. *Hind.* Gururna; *Tam.* Manda pillu, Mungil pillu, Sengamanri pillu; *Kan.* Sanna kari kachi hullu, Akku hullu.
2. APLUDA MUTICA, Linn. *A. varia*, Hack. subsp. *mutica*. Hack; F. B. I. vii. 150.
   Pondicheri (Perrottet).

35. Eremopogon, Stapf

Perennial, rarely annual, erect herbs; culms simple below, more or less branched above, sometimes in fastigiate bundles each supported by a bladeless sheath. *Racemes* spiciform, solitary, terminating each branchlet, spatheate; rhachis many-jointed, fragile, joints and pedicels filiform. *Spikelets* 2-nate, one sessile and one pedicelled, similar in shape, differing in sex, except the 1–3 lowest pairs which are homogeneous and ♂ or empty, disarticulating horizontally. *Sessile spikelets* dorsally compressed: *Callus* small, shortly bearded. *Glumes* equal, thinly chartaceous to membranous; lower 2-keeled with narrowly inflexed margins; upper boat-shaped, acutely 1-keeled. *Lemmas* dissimilar; lower hyaline; upper reduced to a slender stipe, hyaline below, passing into a geniculate awn, rarely with a very narrow hyaline margin shortly cleft at the apex, subtending a bisexual floret; paleas 0. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Pedicelled spikelets* similar to the

sessile, but awnless. *Lemmas* usually absent, sometimes one hyaline, containing a ♂ floret.

EREMOPOGON FOVEOLATUS, Stapf. *Andropogon foveolatus*, Del.; F. B. I. vii. 168; S. I. G. figs. 148, 149.

In all the hotter parts; Bababudan Hills (Meebold); sea-level to 3,000 ft.

Culms tufted, 6–30 in. high; basal sheaths white- or cream-tomentose; leaves 1·3–6 in. long, almost filiform to ·1 in. wide; racemes ·6–1·5 in. long; glumes ·12–·14 in. long, lower ones with a circular median pit above the middle of the back; awns ·7–·9 in. long. A good fodder.

36. Schizachyrium, Nees

Annual or perennial herbs. *Leaves* narrow. *Inflorescence* of terminal, solitary, spiciform racemes supported by or more or less enclosed in narrow spathes, frequently collected into a false panicle; rhachis fragile, many-jointed; joints often stout, thickened upwards with a scarious, cupuliform, more or less toothed terminal appendage. *Spikelets* 2-nate, one sessile, the other pedicelled, differing in sex and often in size and shape, both falling together with the contiguous joint. *Sessile spikelets* dorsally compressed: *Glumes* subequal; lower chartaceous or subcoriaceous. *Lemmas* hyaline; lower empty; upper 2-toothed or 2-fid, rarely entire, awned from the apex or sinus, containing a bisexual floret. *Lodicules* 2. *Stamens* 3, rarely 2. *Styles* 2, free. *Grain* narrowly linear, subterete; embryo short. *Pedicelled spikelets* similar; lower lemma empty; upper if present containing a ♂ floret.

Culms solitary or 2–3 together, 2–30 in. high, divaricately branched from most of the nodes; leaves suddenly narrowed to a sharp point, at least those on the main stems, base rounded and constricted, ·7–1·8 in. long, ·07–·2 in. wide; spathes ·4–·75 in. long, usually as long as the raceme; joints ·08–·11 in. long, glabrous, with a tuft of hairs at the base; lower glume of sessile spikelets ·1–·12 in. long; minutely puberulous; callus with a tuft of hairs; awns ·28–·36 in. long .... 1. *brevifolium*.

Culms tufted, usually densely so, 2–22 in. high, fastigiately branched; leaves tapering from the not or slightly constricted base to the acuminate tip, 1–4 in. long, ·05–·1 in. wide; spathes ·8–1·7 in. long, often

becoming bright red, racemes usually exserted; joints ·17–·2 in. long, densely long white-hairy on the back; lower glume of sessile spikelets ·2–·22 in. long, back long-white-hairy; awns ·4–·55 in. long . 2. *exile.*

1. SCHIZACHYRIUM BREVIFOLIUM, Nees. *Andropopon brevifolius,* Sw.; F. B. I. vii. 165.

Godavari District at Bison Hill (Barber); Nilgiri Hills at Gudalur; Travancore State.

2. SCHIZACHYRIUM EXILE, Stapf. *Andropogon exilis,* Hochst.; F. B. I. vii. 166.

Nellore and Anantapur Districts; Travancore State.

37. **Andropogon,** Linn.

Usually perennial, erect herbs. *Leaves* usually flat. *Inflorescence* of paired, rarely solitary, or corymbose, often digitate or subdigitate, spiciform racemes subtended by spathes, terminating the culms or their branches, sometimes collected into false panicles; rhachis articulated, fragile; joints and pedicels very slender, usually plano-convex, thickened upwards, cupped and usually 2–3-toothed at the apex, more or less densely ciliate. *Spikelets* 2-nate, one sessile, the other pedicelled, differing in sex and usually more or less in shape and size, the lowest pair sometimes homogeneous and imperfect. *Sessile spikelets* dorsally or laterally compressed: *Glumes* equal or subequal, membranous to coriaceous; lower flat, concave or channelled on the back, margins inflexed and sharply keeled at least in the apical half, keels sometimes winged; upper boat-shaped, 1-keeled upwards, sometimes aristulate. *Lemmas* hyaline or the upper one firmer, with or without small paleas; lower empty; upper 2-toothed or -fid, awned from the sinus, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* subulate to oblong, subterete or plano-convex; embryo half as long. *Pedicelled spikelets* often very different from the sessile, always more or less dorsally compressed, never concave or channelled on the back, sometimes reduced and small or entirely suppressed: *Glumes* membranous to chartaceous; upper often 2-keeled upwards, keels sometimes narrowly winged; lower muticous or aristulate. *Lemmas* if present, hyaline, ciliate, muticous; lower empty; upper containing a ♂ floret.

Leaves not or only slightly narrowed at the base :—

Lower glume of sessile spikelets linear-oblong, back deeply channelled, keels not winged ; upper lemma of sessile spikelets shortly 2-fid :—

Culms 4–6 ft. high ; lower leaves 1–3 ft. long, upper 10–20 in. long, ·2–·25 in. wide ; racemes 3–5, sometimes only 2, 1–2 in. long ; lower glume of sessile spikelets ·17–·18 in. long, upper ·18–·2 in. long with a fine arista ·27–·33 in. long ; awn of upper lemma ·6–1 in. long ; glumes and lower lemma of pedicelled spikelets aristate..1. *ascinodis.*

Culms 3–24 in. high ; leaves 1·5–5 in. long, ·05–·2 in. wide ; racemes 2, secund, ·5–1 in. long ; glumes of sessile spikelets ·18 in. long, upper mucronate ; awn of upper lemmas ·5–·6 in. long ; glumes and lemmas of pedicelled spikelets muticous...2. *pumilus.*

Lower glume of sessile spikelets flat, ·28–·3 in. long, keels usually winged at the apex. Culms up to 40 in. high ; leaves 3–8 in. long, ·1–·2 in. wide, more or less hairy ; racemes 2, 1·6–3 in. long ; upper glume of sessile spikelets ·26–·3 in. long, with an arista ·16–·22 in. long ; upper lemma cleft to the middle with an awn ·55–·7 in. long ; lower glume of pedicelled spikelets aristate............3. *longipes.*

Leaves tufted at the base of culms 7–36 in. high, at least the lower tapering to a very narrow, often elongate, almost petioled base, 1·8–8·5 in. long, ·08–·16 in. wide ; racemes 1–3, 1·6–2 in. long ; glumes livid or purple, lemmas white or reddish-purple ; lower glume of sessile spikelets flat, usually with a shallow depression near the base, keels often narrowly winged, apex 2-toothed or -mucronate, ·25–·34 in. long ; upper lemmas cleft to the middle, lobes very narrow, awn ·5–·8 in. long ; glumes and lemmas of pedicelled spikelets muticous, lower glume often narrowly winged at the apex...........4. *lividus.*

1. ANDROPOGON ASCINODIS, C. B. Clarke. *A. apricus*, Hook. f. non Trin. ; F. B. I. vii. 169.

   Ganjam District at Aska (Gamble) ; Coorg.

2. ANDROPOGON PUMILUS, Roxb. ; F. B. I. vii. 170 ; S. I. G. figs. 150, 151.

   In all the drier tracts ; sea-level to 4,000 ft.

   Often on black-cotton soil.

3. ANDROPOGON LONGIPES, Hack. ; F. B. I. vii. 170.

   Nilgiri Hills.

4. ANDROPOGON LIVIDUS, Thw. ; F. B. I. vii. 209.

   Nilgiri and Pulney Hills, at high elevations ; Anaimudi Peak in Travancore at 8,840 ft. (Barnes).

   In open downs often burnt over.

38. Cymbopogon, Hack.

Perennial, densely tufted, often aromatic herbs. *Leaves* flat, often very coarse. *Inflorescence* of paired racemes, usually one of them sessile, the other peduncled, subtended by a spatheole, terminating the culms and their branches, collected into a frequently much-branched panicle; rhachis fragile, several-jointed; spikelets 2-nate, one sessile, the other pedicelled, lowest pair of one or both racemes homogamous (♂ or empty), the rest differing in sex and more or less in shape; joints and pedicels filiform, their tips often more or less cupped or auricled, those of the lowest pair sometimes conspicuously swollen, oblong or barrel-shaped. *Sessile spikelets* (except the lowest one) dorsally, rarely laterally compressed: *Callus* very short, obtuse, shortly hairy. *Glumes* subequal, more or less chartaceous; lower flat, slightly depressed, narrowly grooved or broadly channelled on the back, 2-keeled at least from the middle upwards, keels usually narrowly winged; upper boat-shaped, 1-keeled, keel sometimes narrowly winged. *Lemmas* hyaline; lower entire empty; upper 2-fid or -lobed, awned from the sinus or entire and muticous, rarely firmer and stipitiform below the awn; column of the awn smooth; paleas 0, usually containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, subterete or plano-convex; embryo half as long. *Pedicelled spikelets* differing more or less in shape and size from the sessile, never depressed or grooved on the back: *Glumes* muticous; lower chartaceous; upper thinner. *Lemmas* (usually the lower only present) hyaline, containing a ♂ floret, rarely both suppressed.

The following key is based on Dr. Stapf's in 'Kew Bull.,' 1906, 350, and that of Melle. A. Camus in 'Rev. Bot. Appliq.,' 1921, i, 271.

Spikelets awnless:—

Lower glume of fertile spikelets lanceolate, acute, back flat, 2-keeled, keels narrowly winged, ·16–·18 in. long. Culms up to 5 ft. high; panicles pyramidal or linear-oblong............1. *Nardus.*

Lower glume of fertile spikelets linear or linear-lanceolate, acuminate, back distinctly concave in lower half, ·18–·2 in. long. Very like the last species in other respects....................2. *citratus.*

Fertile spikelets bearing a slender, geniculate awn :—
  Lower glume of fertile spikelets not channelled, at most slightly depressed or foveolate :—
    Lowest pedicel not or hardly stouter than the rest; the longer leaves usually much narrowed to the base :—
      Panicle often greyish, lax, with slender, long, flexuous, often drooping branches and comparatively inconspicuous spathes. Culms 3–6 ft. high; leaves 8–60 in. long, ·1–·8 in. wide; glumes ·18–·2 in. long, back of lower smooth or 1–2-foveolate 3. *flexuosus.*
      Panicle erect, dense, often interrupted, with rather conspicuous, frequently purplish-brown to blackish spathes. Otherwise hardly distinguishable from the last species, slightly more robust with rather shorter awns.............4. *confertiflorus.*
    Lowest pedicel of at least the sessile racemes much swollen, back convex, coriaceous. Culms 1–4 ft. high; leaves 6–25 in. long, ·06–·35 in. long, not narrowed to the base; panicles erect, narrow, often interrupted, hairs of joints and pedicels white, often conspicuously contrasting with the pale-brown spikelets; lower glume of fertile spikelets ·15–·2 in. long, its back flat or slightly depressed below the middle; awns ·3–·6 in. long....5. *coloratus.*
  Lower glume of fertile spikelets deeply channelled :—
    Channel of glume in lower half, very narrow, corresponding to a rib on the inner side :—
      Lowest pedicel of sessile racemes slightly swollen and connate to the base of the rhachis :—
        Leaves linear-lanceolate, subcordate or amplexicaul, 3–18 in. long, ·2–1·25 in. wide, finely caudate. Culms up to 6 ft. high; panicles 4–12 in. long. turning reddish (often very bright) when mature; glumes ·13–·16 in. long; awns ·45–·55 in. long ....6. *Martini.*
        Leaves narrowly linear, not caudate or amplexicaul, 3–12 in. long, ·15–·3 in. wide. Culms up to 3 ft. high; panicles 4–8 in. long, glaucous or straw-coloured when mature; glumes ·12–·16 in. long; awns ·3–·7 in. long............7. *caesius.*
      Lowest pedicels not swollen, free from the rhachis. Culms 1–2 ft. high; leaves subcordate, finely acuminate, 2·5–8 in. long, ·2–·4 in. wide, often purplish near the base; panicles narrow, stiff, spathes often with rudimentary blades, purplish-brown with yellowish scarious margins; spikelets usually green in the lower part and purple in the upper; glumes ·18 in. long; awns ·4–·5 in. long ....8. *polyneuros.*

Fertile glumes wedged between the rather stout joint and the pedicels, deeply channelled for most of its length and all its width between the keels, the channel ceasing abruptly a little above the base, which appears slightly humped, ·15–·16 in. long, not winged; awns ·4–·5 in. long. Culms slender, 6–25 in. high; leaves 1·5–15 in. long, ·03–·26 in. wide..............9. *Gidarba.*

1. CYMBOPOGON NARDUS, Rendle. *Andropogon Nardus,* Linn.; F. B. I. vii. 205.

   Only known in cultivation. Grown for its aromatic oil. The Citronella grass.

2. CYMBOPOGON CITRATUS, Stapf.

   Occurring only as a cultivated plant grown for its aromatic oil. The Lemon grass. Vern. *Tel.* Vasana gaddi, Chippa gaddi, Nimma gaddi; *Tam.* Vasana pillu, Karpura pillu; *Mal.* Vasana pullu.

3. CYMBOPOGON FLEXUOSUS, Wats. *Andropogon Nardus,* Linn. var. *flexuosus,* Hack.; F. B. I. vii. 207.

   In all Districts from Bellary and Chingleput southwards, except on the W. Coast; W. Ghâts. Also cultivated for the extraction of "Malabar lemon-grass oil." A white and a dark form are distinguished. The Ginger grass. Vern. *Tam.* Chukkunari pillu, Sukkunari pillu; *Mal.* Chukkunari pullu; *Kan.* Anthi balai.

4. CYMBOPOGON CONFERTIFLORUS, Stapf. *Andropogon Nardus,* Linn. var. *nilagiricus,* Hack.; F. B. I. vii, 206.

   Rampa Hills (Narayanaswami); W. Coast and Ghâts; 3,000–6,000 ft. Vern. *Toda* Bambai.

5. CYMBOPOGON COLORATUS, Stapf. *Andropogon Nardus,* Linn. var. *coloratus,* Hook. f.; F. B. I. vii. 206.

   In all Districts from Bellary and Nellore southwards except the W. coast; sea-level to 3,000 ft.

   Used for thatch. Frequently deformed by a fungus, *Epichloe* sp. Vern. *Tel.* Botha gaddi; *Tam.* Manda pillu, Manakru pillu, Manjin pillu, Sengamani malai pillu, Sengana pillu; *Kan.* Badhai hullu, Karatha anjai hullu.

6. CYMBOPOGON MARTINI, Wats. *Andropogon Schoenanthus,* Linn. var. *Martini,* Hook. f.; F. B. I. vii. 204.

Eastern and Central Districts from Kistna and Bellary to Coimbatore and Salem; Mysore, Nilgiri and Pulney Hills; sea-level to 5,000 ft. The Geranium grass.

The source of Rusa oil, of which there are two kinds, *Motia* and *Sufia*, which though differing chemically appear to be derived from separate, morphologically indistinguishable races of this species. Sometimes cultivated. Vern. *Hind.* Rusa; *Tel.* Kachi gaddi; *Tam.* Kavattan pillu, Kannam pillu; *Kan.* Kasi hullu, Kunthi hullu, Anchet hullu, Nanj hullu, Bili dodda kachi hullu.

7. CYMBOPOGON CAESIUS, Stapf. *Andropogon Schoenanthus*, Linn. var. *caesius*, Hack.; F. B. I. vii. 205; S. I. G. fig. 164.

From Mysore State, Bellary and Kurnool Districts southwards, except on the W. coast; 500–5,000 ft.

Used for thatching; eaten by cattle only when young. Vern. *Tel.* Kasi gaddi, Kamanchi gaddi; *Tam.* Kamakshi pillu, Mandap pillu, Muchival pillu; *Kan.* Kasi hullu, Kamancha hullu, Anji hullu.

8. CYMBOPOGON POLYNEUROS, Stapf. *Andropogon Schoenanthus*, Linn. var. *versicolor*, Hack.; F. B. I. vii. 205.

Nilgiri Hills; 3,000–7,000 ft.

9. CYMBOPOGON GIDARBA, Haines. *Andropogon Gidarba*, Ham. ex Hook. f.; F. B. I. vii. 208.

Mysore State; Vizagapatam, Cuddapah, Bellary, Nellore and Tinnevelly Districts. Vern. *Tel.* Seetha Kasi gaddi, Thigavomi gaddi.

39. Hackelochloa, O. Kuntze

Annual, erect, much-branched, usually low herbs. *Leaves* linear. *Inflorescence* of axillary and terminal, often fascicled, cylindric, spiciform racemes; rhachis fragile, joints hollowed, completely fused with the pedicels. *Spikelets* 2-nate, dissimilar, one sessile, the other with a pedicel fused to the joint. *Sessile spikelets* globose: *Callus* obconic. *Glumes* subequal; lower cartilaginous, subglobose; upper chartaceous, broadly ovate-oblong, lining the cavity of the joint. *Lemmas* hyaline; lower epaleate and empty; upper paleate, containing a bisexual floret. *Lodicules* 2, broadly cuneate. *Stamens* 3.

Grain suborbicular; embryo ⅔ as long. *Pedicelled spikelets* as long as the sessile or longer: *Glumes* equal, ovate, green; lower slightly asymmetrical; upper boat-shaped, prominently 1-keeled. *Lemmas* sometimes wanting, when present hyaline, empty or the upper containing a ♂ floret.

HACKELOCHLOA GRANULARIS, O. Ktz. *Manisuris granularis*, Linn. f.; F. B. I. vii. 159; Roxb. Cor. Pl. t. 118; S. I. G. fig. 147.

In all the central and eastern Districts and in the hills; usually in the drier tracts; sea-level to 4,000 ft.

Culms 1·5–30 in. high; leaves 1·2–7·5 in. long, ·1–·5 in. wide, hairy, base often cordate; racemes ·2–·7 in. long; lower glume of sessile spikelets ·04–·06 in. long, pitted.

A moderately good fodder. Vern. *Hind.* Trinpali; *Tel.* Kuru jedanai gaddi, Guru singu gaddi; *Kan.* Kadu sanna harka hullu.

40. Ophiuros, Gaertner f.

Erect, usually much-branched herbs. *Leaves* flat or convolute. *Racemes* spiciform, cylindric, terminal on the usually fascicled branchlets; rhachis horizontally or slightly obliquely fragile, joints completely fused with the pedicels to form deeply hollowed, cylindric recesses for the sessile spikelets. *Sessile spikelets* with a narrow callus fused to the base of the joint: *Glumes* equal; lower thickly coriaceous, nearly flat; upper thinly membranous, boat-shaped. *Lemmas* hyaline, paleate; lower containing a ♂ floret or empty; upper containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, slightly compressed; embryo ¼ as long. *Pedicelled spikelets* entirely suppressed or rudimentary and minute.

OPHIUROS EXALTATUS, O. Ktz. *O. corymbosus*, Gaertn. f.; F. B. I. vii. 160. *Rottboellia corymbosa*, Linn. f.; Roxb. Cor. Pl. t. 181.

Mysore State and the Eastern Districts; sea-level to 3,000 ft.

Culms up to 7 ft. high, base tuberous; leaves 4–12 in. long. ·15–·3 in. wide; racemes 1–4 in. long; lower glumes oblong, obtuse, ·08–·11 in. long, smooth or more or less pitted in rows.

Used for thatching. Vern. *Tel.* Pedda panuku; *Tam.* Kinangu pillu, Sothu alagu pillu.

41. Rottboellia, Linn. f.

Annual, sometimes perennial, usually tall herbs, branched above, often with tilt-roots from the lowest nodes. *Leaves* large, broadly linear, flat. *Inflorescence* of solitary, slender, cylindric or very narrowly subulate, spiciform racemes; rhachis nearly horizontally to very obliquely fragile; joints fused with the usually shorter pedicels to form a deeply concave, thin-walled recess to receive the sessile spikelets. *Sessile spikelets* pale: *Glumes* subequal, coriaceous; lower slightly convex and closing the cavity; upper deeply boat-shaped. *Lemmas* hyaline, paleate, nearly as long as the glumes; lower usually enclosing a ♂ floret; the upper a bisexual one. *Lodicules* 2. *Stamens* 3. *Grain* broadly oblong or ellipsoid, compressed; embryo nearly as long. *Pedicelled spikelets* usually shorter than the sessile: *Glumes* green, membranous or chartaceous. *Lemmas* hyaline, both or the upper only containing a ♂ floret or reduced and empty. Joints and spikelets in the upper part of the raceme more and more reduced and forming a tail-like appendage.

ROTTBOELLIA EXALTATA, Linn. f.; F. B. I. vii. 156. Roxb. Cor. Pl. t. 157; S. I. G. fig. 145.

In all Districts except in the driest localities; sometimes growing in water; sea-level to 7,000 ft.

Culms usually several feet, up to 12 ft., high, sometimes quite short; leaves up to 4 ft. long and 1·2 in. wide; racemes 2–6 in. long; joints ·2–·23 in. long; glumes ·15–·22 in. long, the lower of sessile spikelets often narrowly winged on both sides near the apex, upper glumes on the keel and the lower glume of pedicelled spikelets on one side. Vern. *Hind.* Barsali; *Tel.* Konda panuku.

42. Manisuris, Linn.

Annual or perennial low herbs. *Culms* usually tufted and branched. *Leaves* narrow, conduplicate, ultimately flat. *Racemes* solitary, terminal, compressed; rhachis fragile; joints fused with the pedicels to form a short, truncate, convex internode, hollowed on the inner face to receive the sessile spikelets, falling with the 2 spikelets. *Spikelets* 2-nate, one sessile, the other only appearing so by the fusion of its pedicel with the joint. *Sessile spikelets*

dorsally compressed: *Glumes* dissimilar; lower coriaceous, smooth or more or less rugose, muricate or spinulose, its upper half 2-keeled and winged, often 1–2-awned; upper membranous or chartaceous, more or less boat-shaped and 1-keeled. *Lemmas* hyaline, usually paleate; lower empty or containing a ♂ floret; upper containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong; embryo as long. *Pedicelled spikelets* as long as the sessile: *Glumes* coriaceous or chartaceous, smooth, often aristate; lower 2-keeled and usually winged on one keel; upper 1-keeled and variously winged. *Lemmas* hyaline or absent or more or less reduced, when perfect sometimes the upper containing a ♂ floret.

Lower glume of sessile spikelets ovate, acute, not awned, margins winged, wings rounded above, usually narrowed at the middle and expanded at the base; ·11–·13 in. long, back smooth or shallowly transversely grooved, puberulous; glumes of the pedicelled spikelets muticous. Culms wiry, 6–28 in. high; racemes 1–3 in. long
1. *Myurus.*

Lower glumes of all spikelets terminated by flat, single or paired and divaricate awns:—

Lower glume of sessile spikelets ovate, ·13 in. long, tapering into an acuminate awn up to ·36 in. long, its margins winged above the middle, wings narrowly lunate, backs with 3–6 transverse, sometimes slightly warted ridges; lower glume of pedicelled spikelets similar but winged on one side only and the back smooth. Culms slender, 3–12 in. high; leaves 1–3 in. long, very narrow; racemes 1–2 in. long .... 2. *acuminata.*

Lower glume of sessile spikelets lanceolate, acute, ·1–·12 in. long, terminated by 2 divaricate, often unequal awns ·22–·27 in. long, margins winged, wings acute below and tapering onto the base of the awns, back below 4–6-grooved, with 5–9 marginal hooked spinules, the back smooth or with spinules or sometimes the spinules fused into crenulate laminae; lower glume of pedicelled spikelets with an awn ·27–·42 in. long, upper with an arista ·1–·16 in. long. Culms slender, 2–10 in. high; racemes ·8–2·4 in. long
3. *forficulata.*

1. MANISURIS MYURUS, Linn.; Roxb. Cor. Pl. t. 117. *Rottboellia Myurus*, Benth.; F. B. I. vii. 154; S. I. G. fig. 144.

Carnatic; Coimbatore, N. Arcot, Madura and Tinnevelly Districts; usually in dry localities; low elevations to 2,000 ft. Vern. *Tel.* Nalla panuku; *Tam.* Waritsira pillu.

2. Manisuris acuminata, C. E. C. Fischer n. comb. *Rottboellia acuminata*, Hack.; F. B. I. vii. 155.
   Mysore State at Talguppa, 2,000–3,000 ft. (Meebold). On flat rocks.
3. Manisuris forficulata, C. E. C. Fischer in Kew Bull. 1933, 355. *Rottboellia divergens*, Lisboa non Hack.; F. B. I. vii. 155.
   Cochin State at Kavalay; 3,000–4,000 ft. (Meebold).

Var. *hirsuta*, C. E. C. Fischer in Kew Bull. 1933, 357.
   Glumes smaller, densely hirsute, hardly aristate.
   Bababudan Hills (Meebold).

43. Mnesithea, Kunth.

Perennial erect herbs. *Leaves* narrow. *Inflorescence* of solitary, terminal, spiciform, cylindric racemes; rhachis fragile; joints fused with the pedicels into a terete internode deeply hollowed to receive the two sessile opposite spikelets, separated by a hyaline, often evanescent membrane. *Sessile spikelets* all alike: *Glumes* equal in size and shape; lower coriaceous, convex, closing the cavity; upper rather rigidly hyaline. *Lemmas* hyaline; lower resembling the upper glume, paleate or not, empty; upper oblong, its palea shorter, enclosing a bisexual floret. *Lodicules* 0. *Stamens* 3. *Grain* narrowly oblong, compressed; embryo $\frac{2}{3}$ as long. *Pedicelled spikelets* represented by minute rounded or truncate single glumes, rarely by 2.

Mnesithea laevis, Kunth; S. I. G. fig. 146. *Rottboellia perforata* Roxb. Cor. Pl. t. 182; F. B. I. vii. 158.
   In all the east coast Districts; Mysore State; Shevaroy Hills; W. Ghâts from the Nilgiri to the Travancore Hills; sea-level to 3,000 ft.
   Culms 1–4 ft. high; leaves 1–20 in. long; ·1–·35 in. wide; racemes 2–8·5 in. long; joints ·14–·18 in. long.
   Eaten by cattle when young. Vern. *Tel.* Panuku, Kolupu gaddi; *Kan.* Sunku dabbai hullu.

44. Hemarthria, R. Brown

Erect or decumbent, perennial herbs. *Leaves* narrow, flat. *Racemes* spiciform, compressed, often curved, tips more or less subulate owing to the slender terminal spikelet, terminating the

culms and their fascicled branches, subtended by a spathe ; rhachis disarticulating tardily ; joints semicylindric owing to their fusion with the pedicels, hollowed out to receive the sessile spikelets. *Sessile spikelets* closing the cavity in the rhachis : *Glumes* subequal ; lower nearly flat ; upper boat-shaped, 1-keeled, sometimes adhering to the joint and pedicel. *Lemmas* hyaline, with or without paleas ; lower empty ; upper containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, dorsally compressed. *Pedicelled spikelets* very like the sessile : *Glumes* usually more elongate ; upper usually mucronate, caudate or aristate.

HEMARTHRIA COMPRESSA, Kunth. *Rottboellia compressa*, Linn. f. ; F. B. I. vii. 153 ; Roxb. Cor. Pl. t. 156.

Godavari, Nellore and Chingleput Districts ; usually in wet situations.

Culms 1–5 ft. high, decumbent and rooting below ; leaves 1–5 in. long, ·1–·2 in. wide ; racemes 2·5 in. long ; lower glume of sessile spikelets ·18–·23 in. long, 2-keeled, margined or very narrowly winged at apex ; upper glume of pedicelled spikelets sometimes narrowly winged on the keel near the apex. Vern. *Tel.* Shervu panuku.

45. **Digitaria,** Haller

Annual or perennial, slender herbs. *Leaves* narrow, flat, often flaccid. *Inflorescence* of 2–many digitate or more or less distant. alternate, opposite or whorled spikes or racemes, rarely paniculate ; rhachis triquetrous, flat or terete with or without green wings, *Spikelets* usually 2–3-nate, jointed on the pedicels and falling from them entire. *Glumes* dissimilar ; lower a minute membranous scale or delicate, evanescent, hyaline membrane or sometimes absent ; upper membranous, sometimes very thin, rarely absent. *Lemmas* 2 ; lower 5–7-nerved, empty or with a minute palea and lodicules ; upper chartaceous with hyaline margins, faintly 3-nerved ; palea as long as and embraced by the lemma, finely 2-nerved, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed by the slightly hardened lemma and palea, oblong, plano-convex with rounded angles in section.

Racemes not in a pyramidal panicle with the lower opposite or whorled :—

Spikelets ·09 in. or more long. Culms tufted from a geniculate, often rooting base :—

Hairs not clavate-tipped :—

Rhachis flat, up to ·04 in. wide, margins winged. Culms up to 2·5 ft. high; leaves up to 10 in. long; racemes 2–14, subdigitate or 2–3-nate on a short common axis, up to 7 in. long, appressed, acutely acuminate; ·1–·14 in. long; lower glume very small or 0; barren lemma similar to the upper glume and like it with lines of fine appressed, ultimately spreading hairs between the nerves; grain oblong, whitish......1. *marginata.*

Rhachis trigonous, not winged. Culms up to 3 ft. high; racemes 5–13, alternate or opposite, sometimes more or less branched and subverticillate; spikelets 2-nate; upper glumes and barren lemmas more or less silky-hairy. Otherwise as in the last species ....2. *Griffithii.*

Hairs of upper glume and barren lemma clavate-tipped. Culms 6–24 in. high, rarely branched; leaves up to 9 in. long; racemes 2–7, subdigitate on a short common axis, up to 5 in. long; rhachis flat, narrowly winged; pedicles 2–3-nate, hispidulous, the hairs forming a tuft at the tips; spikelets elliptic-oblong, obtuse, ·09–·11 in. long, appressed, subimbricate; lower glume 0; upper shorter than the lemmas, 3-nerved with 4 lines of clavate-tipped brownish hairs; barren lemma similar, somewhat shaggy with clavate-tipped hairs; upper lemma soon becoming dark brown to black; grain ellipsoid, white ....3. *ternata.*

Spikelets ·08 in. or less long :—

Hairs not clavate-tipped :—

Rhachis straight, flat, margins winged :—

Fruiting lemmas pale. Culms rising singly or in fascicles from a long creeping and rooting base, slender, 3–14 in. high; leaves ·5–2·5 in. long; racemes 2 or 3, digitate, slender, ·8–2·5 in. long; pedicels 2–3-nate, flexuous, tips discoid; spikelets elliptic-oblong, ·05–·07 in. long, appressed, subimbricate; lower glume 0 or rudimentary, upper delicate, nearly as long as the spikelet, finely pubescent; barren lemma 7-nerved, appressed-pubescent between nerves; grain ellipsoid, whitish......................4. *longiflora.*

Fruiting lemmas dark brown or black. Culms tufted, base not creeping, 2–20 in. high; leaves 1–4 in. long; racemes

2–5, up to 4 in. long, digitate or when more than 3, 2 or 3 from a lower level; spikelets ·06–·08 in. long. Otherwise as in the last species ....5. *chinensis.*

Rhachis flexuous, trigonous, capillary. Culms tufted, slender, 3–26 in. high; leaves finely acuminate, up to 15 in. long; racemes 3–10, alternate, spreading, sometimes branched, up to 4 in. long; pedicels 2–5-nate, some longer than the spikelets; spikelets elliptic-oblong, acute, ·05–·06 in. long, not imbricate; lower glume 0, upper thinly membranous, pubescent; fruiting lemma elliptic, dark brown, shining ....6. *pedicellaris.*

Hairs on upper glumes and barren lemmas short, clavate-tipped. Culms tufted, 6–24 in. high; leaves up to 6 in. long; racemes 3–15, erect, subdigitate or alternate, up to 4 in. long; rhachis trigonous, slender; pedicels sometimes as long as the spikelets, setulose at least at the apex; spikelets secund, broadly ellipsoid, ·04–·05 in. long; lower glume 0, upper sometimes reduced to a tuft of hairs or ¾ the length of the barren lemma; fruiting lemma black, longitudinally striolate ....7. *Royleana.*

Racemes in a pyramidal panicle, the lower opposite or whorled. Culms creeping below, 3–30 in. high; panicles 1·5–5 in. long, common axis slender, subterete; racemes many, up to 3·5 in. long, divaricate; rhachis capillary, usually naked for a short distance at the base; spikelets narrowly lanceolate, acuminate; upper glume and slightly shorter barren lemma several-ribbed, white appressed-hairy between the ribs...................................8. *Wallichiana.*

1. Digitaria marginata, Link. *D. sanguinalis*, Scop. var. *extensum*, Rang. et Tad., S. I. G. figs. 74, 75. *Paspalum sanguinale*, Lamk. var. *commutatum*, Hook. f.; F. B. I. vii. 15; *ditto* var. *extensum*, Hook. f.; F. B. I. vii. 15; *ditto* var. *Rottleri*, Hook. f.; F. B. I. vii. 16.

In all Districts; sea-level to 7,000 ft.

A good fodder. Vern. *Hind.* Takri takra; *Tam.* Arisi pillu, Akki pillu; *Kan.* Hennu akkibu hullu.

Var. *fimbriata*, Stapf. *D. sanguinalis*, Scop. var. *ciliaris*, Rang. et Tad., S. I. G. figs. 71, 72. *Paspalum sanguinale*, Lamk. var. *ciliare*, Hook. f.; F. B. I. vii. 15. With the hairs of the mature spikelet spread out horizontally forming a rigid fringe on both sides, often mixed with thick-walled bristles from tubercular bases.

Distribution and vernacular names of the species.

2. DIGITARIA GRIFFITHII, Stapf. *D. sanguinalis,* Scop. var. *Griffithii,* Rang. et Tad. S. I. G. fig. 73. *Paspalum sanguinale,* Lamk. var. *Griffithii,* Hook. f.; F. B. I. vii. 15.
   W. Gháts; 2,000–3,000 ft.
3. DIGITARIA TERNATA, Stapf. *Paspalum ternatum,* Hook. f.; F. B. I. vii. 17.
   Bababudan, Nilgiri and Mysore Hills; Ramandrug; 3,000–8,000 ft. Vern. *Kan.* Bili akkabu hullu.
4. DIGITARIA LONGIFLORA, Pers.; S. I. G. figs. 76, 77. *Paspalum longiflorum,* Retz.; F. B. I. vii. 17 *in part.*
   In all Districts; sea-level to 6,000 ft. Vern. *Tel.* Pakuru gaddi; *Kan.* Tapari hullu.
5. DIGITARIA CHINENSIS, Hornem. *Paspalum longiflorum,* Hook. f. non Retz.; F. B. I. vii. 17 *in part.*
   Ganjam, Godavari and Chittoor Districts; Mysore State; Nilgiri, Anaimalai and Pulney Hills; 400–6,000 ft.
6. DIGITARIA PEDICELLARIS, Prain. *Paspalum pedicellare,* Trin.; F. B. I. vii. 19.
   In all Districts, except in the driest and wettest parts; 2,000–6,000 ft.
7. DIGITARIA ROYLEANA, Prain. *Paspalum Royleanum,* Nees; F. B. I. vii. 18.
   Mysore State at Shimoga (Meebold); Ramandrug; 2,000–3,000 ft. Vern. *Kan.* Bili akkabu hullu.
8. DIGITARIA WALLICHIANA, Stapf. *Paspalum Perrottetii,* Hook. f.; F. B. I. vii. 20.
   Bababudan, Nilgiri and Pulney Hills; 4,000–7,000 ft.

46. **Alloteropsis,** Presl.

Annual or perennial, erect herbs. *Leaves* usually flat. *Racemes* spiciform, digitate or whorled, often compound. *Spikelets* solitary, twin or fascicled, more or less compressed dorsally, articulated on and falling entire from the pedicels. *Glumes* thinly membranous to chartaceous; the lower the shorter; the upper nearly as long as the spikelet and densely ciliate. *Lemmas* dissimilar; the lower as long as or longer than the upper, its palea short, 2-fid or 2-partite, enclosing a ♂ floret; the upper narrowed into a short mucro or an arista, its palea 2-nerved and 2-keeled with basal

auricled flaps, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic-oblong to suborbicular, dorsally compressed, free within the hardened lemma and palea.

ALLOTEROPSIS CIMICINA, Stapf. *Axonopis cimicinus*, Beauv.; F. B. I. vii. 64; S. I. G. figs. 107, 108.

In all Districts; sea-level to 4,000 ft.

Culms up to 3 ft. high; leaves lanceolate, base cordate, ·5–4·25 in. long, ·15–·7 in. wide, glabrous or more or less hairy from tubercles; racemes few to many, 2–9 in. long; spikelets ·12–·15 in. long; upper lemma mucronate or with an arista up to ·13 in. long. Vern. *Kan.* Niru sajjai hullu.

47. Pseudechinolaena, Stapf

Annual herbs. *Culms* slender, erect from a prostrate rooting base. *Leaves* flaccid. *Panicle* simple; racemes few, spiciform. *Spikelets* pedicelled, 2-nate or more often solitary with or without an accompanying reduced one, secund. *Glumes* herbaceous, subequal or the lower shorter; lower nearly flat, 3-nerved, smooth or nearly so; upper boat-shaped, gibbous below, 7-nerved with rows of transparent spots between, naked or with short or long hooked hairs or bristles from the spots. *Lemmas* chartaceous; lower membranous at the margins and hyaline at a point at the base, oblong-lanceolate, laterally compressed, rounded on the back, as long as the spikelet, its palea more or less convolute, 2-nerved, empty or containing a ♂ floret; upper shorter, broadly lanceolate to oblong, back very convex, faintly 5-nerved, its palea similar, tightly clasped by the lemma when mature, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, plano-convex, gibbous on the back at the apex.

PSEUDECHINOLAENA POLYSTACHYA, Stapf. *Panicum uncinatum*, Raddi; F. B. I. vii. 58.

W. Ghâts from Mysore to Travancore; 2,000–6,000 ft.

Culms 3–24 in. high; leaves ovate to linear-lanceolate, acuminate, 1–3 in. long, ·17–·65 in. wide, more or less hairy or pubescent; panicles up to 7 in. long; racemes up to 2 in. long; spikelets obliquely ovoid, ·14–·19 in. long; bristles when present up to ·07 in. long.

48. Eriochloa, H. B. et K.

Annual or perennial erect herbs. *Leaves* more or less flat. *Inflorescence* racemosely panicled; racemes peduncled or the upper subsessile. *Spikelets* solitary or 2-nate, secund, ovate-lanceolate to oblong, acute or acuminate, sometimes finely, shortly aristulate, the base thickened into an annular callus, falling entire from the thickened apex of the pedicels. *Glumes* very unequal; lower reduced to a minute cupular rim clasping the callus; the upper membranous, corresponding to the outline of the spikelet, faintly 5-nerved, sometimes aristulate. *Lemmas* dissimilar; lower about equalling and resembling the upper glume, sometimes 2-keeled, empty or enclosing a ♂ floret; the upper chartaceous or almost crustaceous, faintly 5-nerved, with a fine barbellate mucro, its palea 2-keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* dorsally compressed, free within its lemma and palea and the upper glume and lower lemma.

ERIOCHLOA PROCERA, C. E. Hubbard. *E. polystachya*, H. B. et K.; F. B. I. vii. 20; S. I. G. figs. 78, 79.

In all Districts; sea-level to 3,000 ft. Often in rice-fields.

Perennial; culms tufted, 1–5 ft. high; leaves up to 13 in. long, ·15–·4 in. wide; racemes numerous, alternate, up to 4 in. long; spikelets ·13–·15 in. long; upper glume and lower lemma finely white-silky, sometimes glabrescent in fruit.

Much liked by cattle. Vern. *Tam.* Tandambaran pillu, Mathanka pillu, Karungani pillu.

49. Brachiaria, Griseb.

Annual or perennial herbs. *Leaves* narrow, usually flat. *Inflorescence* of spiciform, sometimes branched racemes, subsessile on a common filiform, triquetrous or more or less flattened rhachis, rarely panicled; pedicels solitary or twin. *Spikelets* elliptic- to ovate-oblong, more or less dorsally compressed, the convex side turned away from the rhachis. *Glumes* dissimilar; the lower towards the rhachis and much shorter than the upper. *Lemmas* dissimilar; the lower subequal to and resembling the upper glume, its palea similar, with well-developed incurved flaps below the middle, usually enclosing a ♂ floret; the upper crustaceous or subcoriaceous, with firm, narrowly involute margins, its palea

similar and almost as long, 2-keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* broadly oblong or elliptic, more or less flattened, tightly enclosed in the more or less hardened lemma and palea.

Spikelets imbricate or approximate :—

Rhachis flat, margins scaberulous, often setulose; spikelets secund :—

Culms 3–30 in. high, slender, nodes glabrous, rarely puberulous; leaves ·6–6·5 in. long, ·15–·4 in. wide; racemes 2–6, simple :—

Peduncle below the inflorescence more or less hairy; spikelets elliptic-obovate, acute or subacute, ·1–·12 in. long. Culms prostrate or straggling, 2–20 in. high; leaves ·6–2·7 in. long, ·15–·3 in. wide; racemes 2–4, ·9–1·7 in. long...... 1. *distachya.*

Peduncle glabrous, rarely puberulous; spikelets elliptic or elliptic-oblanceolate, acute, usually apiculate, ·14–·16 in. long. Culms usually erect, 12–30 in. high; leaves 3–6·5 in. long, ·16–·4 in. wide; racemes 4–6, 1–2·6 in. long.... 2. *miliiformis.*

Culms 3–8 ft. high, robust, nodes villous; leaves 5–12 in. long, ·3–·7 in. wide; racemes numerous, 1–3·5 in. long, the lowest at least usually branched; spikelets lanceolate, acute, ·12–·13 in. long; pedicels usually setose; lower glume ·05 in. long, upper ·11–·12 in. long.................................... 3. *mutica.*

Rhachis trigonous or terete :—

Spikes erect, appressed to the rhachis, 6–11, ·2–·8 in. long. Leaves softly pilose from bulbous bases, ·6–3·5 in. long, ·07–·22 in. wide, base rounded; spikelets secund, elliptic to broadly oblong, ·07–·09 in. long; lower glume ·02 in. long, glabrous, upper ·06 in. long, pilose, rarely glabrous.......... 4. *cruciformis.*

Spikes erecto-patent or horizontal :—

Leaves lanceolate, base subcordate, clasping the culm, 1·7–6 in. long, ·15–·7 in. wide, glabrous or pubescent, spikes up to 2 in. long; spikelets not secund, broadly elliptic, acute or apiculate, ·1–·13 in. long; lower glume ·04–·07 in. long, upper broadly oblong, apiculate, ·09–·1 in. long, puberulous.. 5. *ramosa.*

Leaves ovate, base rounded, not clasping, ·5–1·8 in. long, ·18–·55 in. wide, softly villous, margins markedly cartilaginous, often crisped; spikes ·4–·75 in. long; spikelets secund, elliptic-obovate, ·08–·095 in. long; lower glume ·025–·04 in. long, obtuse, upper obovate, obtuse, gibbous, ·06–·08 in. long, glabrous or puberulous; lower lemma longer than the glumes 6. *semiundulata.*

Spikelets distant; upper glume elliptic-oblong, glabrous:—

Upper lemma broadly stipitate. Culms erect, up to 8 ft. high; leaves ensiform from a narrowed, rounded base, finely acuminate, 4–9 in. long, ·27–·8 in. wide; spikes numerous, up to 3·5 in. long, lower often verticillate; rhachis usually more or less pubescent; spikelets elliptic, ·14–·15 in. long; lower glume ·05–·08 in. long, upper ·11–·13 in. long; upper lemma usually rugulose 7. *semiverticillata.*

Upper lemma subsessile. Culms weak, decumbent, 1–2 ft. high; spikes not verticillate:—

Leaves narrowly linear, glabrous or slightly puberulous at the narrow base, 2·5–8·5 in. long, ·1–·13 in. wide, margins and sheaths not ciliate; spikes usually numerous, up to 4 in. long; spikelets elliptic, ·1–·13 in. long; lower glumes ·05–·08 in. long, upper ·1–·11 in. long.................................8. *remota.*

Leaves linear-lanceolate to lanceolate, base rounded or subcordate, usually sparsely bristly from bulbous bases, 2–6 in. long, ·25–·65 in. wide, margins usually ciliate from bulbous bases, at least near the base, sheaths ciliate; spikes usually few. Other characters as in the last species.....................9. *Kurzii.*

1. BRACHIARIA DISTACHYA, Stapf. *Panicum distachyum*, Linn.; F. B. I. vii. 37; S. I. G. figs. 97, 98.

   In all Districts; sea-level to 3,000 ft. Vern. *Tel.* Koranna gaddi; *Kan.* Hambu haraka hullu.

2. BRACHIARIA MILIIFORMIS, Chase. *Panicum distachyum*, Linn.; F. B. I. vii. 37 *in part.*

   S. Kanara and N. Coimbatore Districts; Travancore. Vern. *Kan.* Kada samai hullu.

   Very similar to the last species and often confused with it.

3. BRACHIARIA MUTICA, Stapf. *Panicum muticum*, Forsk.; F. B. I. vii. 34.

   Shevaroy Hills (Perrottet); Tinnevelly District at Mundanthorai (Barber) and Courtallam (Venkoba Rao).

   A native of America and W. Africa, introduced and run wild here and there. An excellent fodder.

4. BRACHIARIA ERUCIFORMIS, Griseb. *Panicum Isachne*, Roth; F. B. I. vii. 28; S. I. G. figs. 80, 81.

   In all Districts; sea-level to 6,000 ft.

   A moderate fodder. Vern. *Tel.* Domakalu gaddi.

5. BRACHIARIA RAMOSA, Stapf. *Panicum ramosum,* Linn.; F. B. I. vii. 36; S. I. G. figs. 95, 96.
   In all Districts; sea-level to 6,000 ft. Vern. *Tel.* Eduri gaddi; *Kan.* Kadu baragu hullu.
6. BRACHIARIA SEMIUNDULATA, Stapf. *Panicum villosum,* Lamk.; F. B. I. vii. 34.
   W. Ghâts; 5,000–7,000 ft.
7. BRACHIARIA SEMIVERTICILLATA, Alston. *Panicum semiverticillatum,* Rottl.; F. B. I. vii. 38.
   Nilgiri, N. Coimbatore, Anamallai, Pulney and Tinnevelly Hills; 1,500–6,000 ft. Vern. *Kan.* Manju hullu, Thapparakai hullu.
8. BRACHIARIA REMOTA, Haines. *Panicum remotum,* Retz.; F. B. I. vii. 38.
   Ganjam District at Chatrapur (Fischer); Salem to Tinnevelly Districts; Anamallai and Travancore Hills; sea-level to 3,000 ft.
9. BRACHIARIA KURZII, A. Camus. *Panicum Kurzii,* Hook. f.; F. B. I. vii. 38.
   Rampa Hills (Narayansawami).

50. Paspalum, Linn.

Perennial, sometimes annual herbs. *Leaves* narrow, flat or more or less inrolled. *Inflorescence* of solitary, digitate or racemose spikes; rhachis flat and winged or trigonous. *Spikelets* secund, 2-seriate, solitary or paired, sessile or nearly so, orbicular, oblong or ovate. *Lower glume* usually absent, rarely represented by a small scale; upper membranous, about equalling the spikelet, rarely shorter or absent, 3-more-nerved. *Lemmas* dissimilar; lower similar to the upper glume, empty; upper chartaceous to crustaceous, faintly nerved, its palea subequal, similar and embraced by it, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* more or less biconvex, tightly enclosed in the hardened lemma and palea.

Spikelets ·09 in. or more long:—
 Glume and lemmas glabrous; spikelets normally 2-ranked:—
  Spikelets suborbicular or nearly so, obtuse, ·09–·13 in. long. Rhizome short; culms ½–3 ft. high, leaves glabrous, up to

18 in. long, ·15–·4 in. wide; racemes 2–5, rarely solitary, ·8–5·8 in. long; rhachis broad, winged, with a median keel, produced at the apex into 2 short rounded or acute lobes; upper lemma and palea crustaceous, latter with wide membranous auricles at the base.......................................1. *scrobiculatum.*

Spikelets oblong to oblong-lanceolate, acute or subacute. Culms creeping and rooting below :—

Spikelets oblong, subacute, ·1–·13 in. long; upper lemma nearly as long as the spikelet. Culms up to 3 ft. high; leaves flat, up to 8·5 in. long, ·15–·25 in. wide, glabrous or more or less densely hairy; racemes 2–3, ·8–3·5 in. long..2. *orbiculare.*

Spikelets oblong-lanceolate, acute, ·12–·14 in. long; upper lemma $\frac{1}{3}$–$\frac{1}{4}$ shorter than the spikelet. Culms up to 13 in. high; leaves flat or involute, ·9–4·3 in. long, ·07–·16 in. wide, glabrous; racemes 2, very rarely 3, ·5–2 in. long
3. *vaginatum.*

Glume and barren lemma puberulous or hairy; spikelets normally 4-ranked :—

Racemes usually 7–9, 1·2–3 in. long; spikelets suborbicular, acute, ·08–·1 in. long. Culms erect, up to 4 ft. high; leaves up to 10 in. long, ·15–·3 in. wide; rhachis glabrous or nearly so, with setulose margins; glume and barren lemma minutely puberulous ....4. *longifolium.*

Racemes usually 3–5, 2–4 in. long; spikelets broadly ovate, acute, ·14–·16 in. long. Culms erect, up to 5 ft. high; leaves up to 10 in. long, ·4–·5 in. wide; rhachis hairy at the base, with minutely scabrid margins; glume and barren lemma sparsely silky, long white-ciliate ....5. *dilatatum.*

Spikelets ·06–·07 in. long :—

Racemes paired, rarely 3, 1·3–5 in. long; rhachis flat, margins cartilaginous and smooth or scaberulous; spikelets compressed plano-convex, subobtuse, apiculate or shortly acute; glume ciliate with rather long white hairs, barren lemma glabrous. Culms erect from often very long rooting runners, up to 3 ft. high; leaves up to 8 in. long, ·35–·6 in. wide, glabrous..............6. *conjugatum.*

Racemes 6–20, alternate, ·15–1 in. long; rhachis subtriquetrous, margins more or less bristly from tubercles; spikelets turgidly plano-convex, obtuse; glumes more or less ciliate with rigid hairs from tubercles; barren lemma more or less bristly. Culms 2–12 in. high; leaves ·7–3 in. long, ·2–·65 in. wide; sparsely hairy on the ribs ....7. *compactum.*

1. Paspalum scrobiculatum, Linn.; F. B. I. vii. 10; S. I. G. figs. 69, 70.
   In all Districts; sea-level to 7,000 ft. Wild or cultivated. The wild form, which is generally smaller and more slender, is the var. *Commersonii*, Stapf.
   The grain is used for food, but requires careful preparation as it is liable to act as a narcotic poison. The straw makes good cattle-fodder. Vern. *Hind.* Kodo; *Ur.* Khoddi; *Tel.* Arugu, Nita ari gaddi, Arikelu. *Tam.* Varagu, Karu varagu; *Kan.* Haraku hullu, Arikel.
2. Paspalum orbiculare, Forst. *P. scrobiculatum*, Linn.; F. B. I. vii. 11 *in part.*
   Ganjam, Nellore, Arcot and Coimbatore Districts; sea-level to 2,000 ft.
3. Paspalum vaginatum, Sw. *P. distichum*, Linn.; F. B. I. vii. 12.
   In sea-shore and river sand; near sea-level.
4. Paspalum longifolium, Roxb. *P. scrobiculatum*, Linn.; F. B. I. vii. 11 *in part.*
   Travancore.
5. Paspalum dilatatum, Poir.
   A S. American fodder-grass; introduced and occasionally run wild.
6. Paspalum conjugatum, Berg.; F. B. I. vii. 11.
   Mysore; Wynaad; Travancore; 500–4,000 ft.
7. Paspalum compactum, Roth.; F. B. I. vii. 12.
   Bababudan, Coorg, Nilgiri and Travancore Hills; 4,000–6,000 ft.

51. Stenotaphrum, Trin.

Perennial or annual, erect herbs, often creeping or prostrate at the base. *Leaves* flat, with compressed sheaths. *Panicles* spiciform, terminal or sometimes also from the upper axils; rhachis flat, continuous or jointed, bearing 1–8 spikelets sunk in hollows or chambers in its anterior face. *Spikelets* lanceolate to ovate-oblong, falling entire from rudimentary pedicels. *Glumes* 2, dissimilar; the lower smaller, sometimes scale-like; the upper nearly or quite as long as the spikelet, 5–11-nerved. *Lemmas*

similar, chartaceous to coriaceous; the lower paleate or not, empty or containing a ♂ floret; the upper with a 2-keeled palea of similar texture, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free or nearly so. *Grain* broadly elliptic-oblong, plano-convex, closely embraced by, but free within the lemma and palea; embryo half as long.

STENOTAPHRUM DIMIDIATUM, Brogn. *S. glabrum*, Trin.; F. B. I. vii. 90.

Travancore State at Ambalapuzha (Ranga Achariyar). Rare. Culms erect from the root or from a slender rhizome, 5–13 in. high; leaves exactly linear, apex rounded, 1·3–3 in. long; ·15–·2 in. wide; panicle 1–3·6 in. long; rhachis alternately narrowly and broadly winged on one side and the other, the broader wing usually with an apical tooth and forming the hollow to receive the spikelet, spikelets ·15–·19 in. long; lower glume rounded, ·05 in. long.

52. Paspalidium, Stapf

Perennial terrestrial or semi-aquatic herbs; culms often spongy below. *Leaves* flat or involute. *Inflorescence* of few to many spiciform, sessile or subsessile racemes secund on a common triquetrous rhachis. *Spikelets* ovoid to ovate-lanceolate, turgid or more or less compressed. *Glumes* dissimilar and unequal; the lower much the smaller, turned away from the axis. *Lemmas* dissimilar; lower similar to, but usually longer than the upper glume, margins inflexed, with or without a palea, containing a ♂ floret; the upper elliptic, crustaceous with firm, involute margins, its palea 2-keeled, of the same texture, almost as long, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed in the more or less hardened lemma and palea.

Spikelets ovoid or subglobose, hardly compressed, obtuse or acute, ·09–·13 in. long; lower glume broadly ovate or suborbicular, rounded, ·05–·07 in. long; upper glume acute, ·07–·1 in. long; lemmas ·08–·12 in. long, smooth. Leaves ciliate near the base, 1–13 in. long, ·1–·4 in. wide; racemes usually, the lowest always, shorter than the internodes, distant ·3–1·3 in. long .... 1. *flavidum*.
Spikelets ovate to ovate-lanceolate, acute or apiculate, distinctly flattened; lower glume broader than long, thinly membranous

truncate, retuse or undulate, ·03 in. long; racemes mostly as long as or longer than the internodes, the lowest sometimes shorter, imbricate, ·3–1·6 in. long. Culms often spongy below:—

Upper glume broadly oblong, obtuse, ·07 in. long; lower lemma acute or apiculate, ·09–·11 in. long; upper lemma ·09 in. long, distinctly punctate. Leaves 2·2–9 in. long, ·1–·3 in. wide 2. *punctatum*.

Upper glume broadly ovate, apiculate, ·07–·08 in. long; lower lemma apiculate, ·08–·09 in. long; upper lemma smooth. Leaves 7–12 in. long, ·2–·3 in. wide ....3. *geminatum*.

1. Paspalidium flavidum, A. Camus. *Panicum flavidum*, Retz.; F. B. I. vii. 28; S. I. G. figs. 82, 83.

In all Districts; sea-level to 4,000 ft.

The spikes are sometimes reduced to 1–3 spikelets.

A good fodder. Vern. *Hind.* Sanka; *Tel.* Uda gaddi; *Tam.* Arisi pillu.

2. Paspalidium punctatum, Stapf. *Panicum punctatum*, Burm.; F. B. I. vii. 29.

In all the eastern Districts; sea-level to 600 ft. Often in water.

3. Paspalidium geminatum, Stapf. *Panicum paspaloides*, Pers.; F. B. I. vii. 30. *P. fluitans*, Retz.; S. I. G. figs. 84, 85.

In all Districts; sea-level to 3,500 ft. Often in water. Vern. *Kan.* Gaddai vadavina hullu.

53. **Urochloa**, Beauv.

Annual or perennial herbs. *Leaves* linear-lanceolate to ovate, flat. *Inflorescence* of several racemes sessile or subsessile on a common, more or less triquetrous, rarely strap-shaped axis with a straight or zig-zag keel on the anterior face; pedicels solitary or twin, 2–several seriate. *Spikelets* broadly ovate to lanceolate, more or less flattened or depressed, the convex side turned towards the axis, falling entire from the disc-tipped pedicels. *Glumes* membranous, usually very unequal; the lower the shorter, turned away from the axis; the upper either glabrous or more or less densely felted-pubescent. *Lemmas* dissimilar; the lower closely resembling the upper glume in all respects, empty or holding a ♂

floret; the upper crustaceous or subcoriaceous with narrow involute margins, elliptic-oblong, concave, obtuse and usually with a scabrid or barbellate mucro or cusp, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed in the more or less hardened lemma and palea.

Spikelets ·13–·16 in. long; upper lemma distinctly cuspidate:—
Spikelets ovate to elliptic-oblong, acute. Culms up to 3 ft. high; leaves subcordate, clasping the stem, hairy or rarely nearly glabrous, ciliate from tubercles, 1·2–6·7 in. long, ·2–·7 in. wide; lower glume broadly ovate, clasping the base of the spikelet, acute or obtuse, ·04–·06 in. long; upper glume and lower lemma about the size and shape of the spikelet; upper lemma with a cusp ·03 in. long
1. *panicoides.*

Spikelets lanceolate, acuminate. Leaves glabrous, 1·2–4·4 in. long, ·3–·85 in. wide. Other characters as in the last species
2. *setigera.*

Spikelets ovate to elliptic, acute or apiculate, ·07–·09 in. long. Culms prostrate or creeping, rather slender, up to 20 in. long; leaves rounded at base, clasping the stem or not, glabrous or minutely pubescent, ·5–3·5 in. long, ·12–·6 in. wide; lower glume suborbicular, ·02–·03 in. long; upper glume and lower lemma elliptic-ovate, acute; upper lemma broadly oblong, apiculate or mucronate, ·06 in. long
3. *reptans.*

1. UROCHLOA PANICOIDES, Beauv. *Panicum javanicum*, Hook. f. non Poir.; F. B. I. vii. 35; S. I. G. figs. 1, 3, 4, 7, 93, 94.
In all Districts except the wettest; sea-level to 3,000 ft.
The grain is eaten by the poor. A good fodder. Vern. *Hind.* Kuri; *Tel.* Salla wudu; *Kan.* Kadu billi samai hullu.

2. UROCHLOA SETIGERA, Stapf. *Panicum setigerum*, Retz.: F. B. I. vii. 36.
Eastern and Central Districts from Kistna to Tinnevelly; sea-level to 2,000 ft.
An excellent fodder.

3. UROCHLOA REPTANS, Stapf. *Panicum prostratum*, Lamk.; F. B. I. vii. 33; S. I. G. figs. 91, 92.
In all Districts except the wettest; sea-level to 6,000 ft.
The grain is eaten by the poor in times of scarcity. A good fodder much liked by cattle. Vern. *Tam.* Shani pillu.

54. Echinochloa, Beauv.

Annual or perennial, often tall herbs. *Leaves* narrow. *Inflorescence* of crowded panicles of loosely arranged, secund, spiciform branches bearing spikelets from the base or near it; rhachis triquetrous. *Spikelets* ovate to elliptic- or lanceolate-oblong, 2-nate or clustered, articulated on and falling entire from the pedicels. *Glumes* membranous, unequal; the lower much the shorter, mucronate, cuspidate or awned; the upper coincident in outline with the spikelet, acute, cuspidate or shortly awned. *Lemmas* dissimilar; the lower equalling the upper glume (excluding cusp or awn), its palea 2-keeled, empty or containing a ♂ floret; the upper subcoriaceous or crustaceous, ovate to elliptic-oblong, obtuse or apiculate, polished, very convex on the back, its palea as long, with rounded sides and flaps, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* broadly elliptic, plano-convex.

Racemes simple, rather distant, ·3–1·25 in. long; lower glume and upper lemma about equal; obtuse, acute or cuspidate. Annual, up to 2 ft. high; leaves 2–8 in. long, ·15–·45 in. wide, ligule 0; spikelets ovoid, ·1–·12 in. long; lower glume ·04–·05 in. long, upper ·09–·11 in. long; lemmas ·08–·1 in. long, lower with a ♂ floret......1. *colona*.

Racemes usually more or less branched, ·8–2 in. long; lower glume and upper lemma cuspidate or awned, the latter the longer; lower lemma often awned:—

Annual, up to 3 ft. high; leaves 3–21 in. long, ·2–·5 in. wide, ligule 0, junction of blade and sheath glabrous, usually marked by a brown zone; spikelets ·15–·18 in. long; lower glume ·07–·12 in. long, upper ·15–·17 in. long; lower lemma empty, ·14–·17 in. long, upper ·12–·15 in. long; awn of lower lemma up to 2 in. long 2. *crus-galli*.

Usually perennial, up to 6 ft. high; culms rooting and often branching from submerged nodes; leaves 3–18 in. long, ·2–·4 in. wide, ligule a fringe of stiff hairs, sometimes absent on the uppermost leaf; lower lemma empty or with a ♂ floret. Otherwise as in the last species ....3. *stagnina*.

1. Echinochloa colona, Link. *Panicum colonum*, Linn.; F. B. I. vii. 32; S. I. G. figs. 89, 90.

In all Districts, except in the wettest localities; sea-level to 6,000 ft.

An excellent fodder. The grain is eaten by the poorer classes. Vern. *Hind.* Sawank; *Tel.* Otha gaddi, Kaproda gaddi; *Tam.* Sawu, Sauri, Varsanum pillu, Karum pul.

Var. *frumentacea*, C. E. C. Fischer n. comb. *Panicum Crus-galli*, Linn. var. *frumentaceum*, Hook. f.; F. B. I. vii. 31. A taller and more robust plant with dense, sometimes corymbose panicles. Cultivated for its grain in most Districts. The straw is a valuable fodder. Vern. *Hind.* Shamula, Sanwa; *Ur.* Samu; *Tel.* Bonta shama, Pala oodalu, Sawa, Chamalu; *Tam.* Kudrai-valli pillu, Rail pillu; *Kan.* Samai, Savai.

2. ECHINOCHLOA CRUS-GALLI, Beauv. *Panicum Crus-galli*, Linn.; F. B. I. vii. 31; S. I. G. figs. 6, 86, 87.

In most Districts; in rice-fields and other wet places; sea-level to 6,000 ft.

The grain is eaten by the poor. A good cattle-fodder and sometimes cultivated for that purpose. Vern. *Hind.* Sanwak; *Tel.* Pedda-wundu; *Kan.* Kadu dabhai hullu.

3. ECHINOCHLOA STAGNINA, Beauv.; S. I. G. fig. 88. *Panicum Crus-galli*, Linn.; F. B. I. vii. 31 *in part.*

In all Districts, in wet places, often partly submerged: sea-level to 3,000 ft.

Often confused with the last species. Vern. *Tel.* Bontha oodu; *Kan.* Kadu dabhai hullu.

55. **Oplismenus**, Beauv.

Annual or perennial herbs, usually decumbent and rooting at the base. *Leaves* thin, flat, ovate to lanceolate, often rather unsymmetrical. *Inflorescence* of simple or panicled spiciform racemes. *Spikelets* solitary or fascicled, secund. *Glumes* subequal, herbaceous or membranous, more or less keeled upwards, both or only the lower awned. *Lemmas* dissimilar; the lower similar to but longer than the glumes, muticous, mucronate or aristate, its palea perfect, reduced or absent, containing a ♂ floret or empty; the upper chartaceous to subcoriaceous, nearly as long as the lower, muticous, its palea as long as and embraced by the lemma, containing a bisexual floret. *Lodicules* 2, broadly cuneate, often very delicate. *Stamens* 3. *Styles* 2, free. *Grain* oblong, tightly embraced by the hardened lemma and palea.

Perennial; culms slender to rather robust, up to 3 ft. high; leaves ·8–6·5 in. long, ·25–1 in. wide; panicles up to 1 ft. long; racemes distant, few to many, sometimes reduced to subsessile clusters of spikelets, up to 3 in. long: spikelets ·12–·18 in. long, awns needle-like, smooth, up to ·43 in. long......................1. *compositus.*
Annual; culms slender, up to 18 in. high; leaves ·7–2·2 in. long, ·2–·55 in. wide; panicles up to 4 in. long; racemes distant or close, few, up to ·7 in. long; spikelets ·09–·1 in. long, awns capillary, minutely scaberulous, up to ·41 in. long..............2. *Burmannii.*

1. OPLISMENUS COMPOSITUS, Beauv.; F B. I. vii. 66. *O. undulatifolius*, Hook. f. non Beauv.; F. B. I. vii. 66.
   In all Districts; sea-level to 7,000 ft. Common. Vern. *Tel.* Kodi juttu gaddi, Konda anthrika gaddi.
2. OPLISMENUS BURMANNII, Beauv.; F. B. I. vii. 68.
   In all Districts; sea-level to 3,000 ft.
   Much liked by cattle. A good hay-making grass. Vern. *Tam.* Mungil pillu.

56. Ottochloa, Dandy

Perennial herbs, creeping and rooting below, geniculate and scrambling above. *Leaves* narrow, flat, firmly papery. *Panicles elongate, widely open or contracted;* racemes more or less distant, short; rhachis and pedicels filiform. *Spikelets* usually in small, approximate or distant clusters, narrowly oblong, acute, dorsally compressed. *Glumes* 2, similar and subequal, firmly membranous, much shorter than the spikelet. *Lemmas* subequal; the lower membranous, the size and shape of the spikelet, empty; the upper subcoriaceous, margins very narrowly hyaline, its palea similar, embraced by it all along, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic, almost flat.

OTTOCHLOA NODOSA, Dandy. *Panicum nodosum*, Kunth; F. B. I. vii. 43.

Travancore State; at low elevations and up to 6,000 ft. (Meebold).

Culms up to 6 ft. high; leaves narrowed and almost petioled or rounded or subcordate, 1·8–5 in. long, ·32–·5 in. wide; panicles up to 8 in. long, branches up to 5 in. long; spikelets ·13–·15 in. long.

57. **Holcolemma,** Stapf et Hubbard

Annual or perennial herbs. *Leaves* linear, flat. *Panicles* narrow, spiciform. *Spikelets* fascicled or solitary on a slender, simple rhachis, together with setae at the lower nodes or replaced by setae, oblong to lanceolate, back flat and deeply channelled. *Glumes* hyaline or thinly membranous; the lower $\frac{1}{4}$–$\frac{1}{3}$ as long as the spikelet; the upper slightly longer. *Lemmas* dissimilar; the lower as long as the spikelet, base slightly saccate, membranous with a longitudinal median channel of thinner tissue, its palea as long, 2-keeled, concave and hyaline between the keels, empty or enclosing a ♂ floret; the upper as long as or slightly shorter than the lower, becoming crustaceous, finely granulate and transversely rugose, enclosing its similar palea except at the tip, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic-oblong, dorsally compressed.

HOLCOLEMMA CANALICULATUM, Stapf et Hubb. *Panicum canaliculatum*, Nees; F. B. I. vii. 43.

Precise locality unknown (Wight).

Culms slender, weak, up to 4 ft. high; leaves flaccid, 3–6 in. long, ·1–·15 in. wide, finely acuminate; panicles 1·5–4 in. long; spikelets ·12–·14 in. long.

58. **Panicum,** Linn.

Annual or perennial, erect or procumbent, sometimes woody herbs. *Leaves* very diverse. *Inflorescence* of usually open panicles, generally much divided. *Spikelets* lanceolate to oblong, elliptic or orbicular, rarely somewhat oblique, falling entire or nearly so. *Glumes* herbaceous; the lower rarely absent, sometimes hyaline, usually considerably shorter than the upper, seldom as long; the upper rounded on the back. *Lemmas* dissimilar; the lower similar and subequal to the upper glume, with or without a palea, empty or enclosing a ♂ floret; the upper coriaceous or crustaceous, obtuse or acute, muticous, margins usually involute, its palea similar, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed in the hardened lemma and palea.

Lower glume distinct, at least $\frac{1}{5}$ as long as the spikelet :—
Leaves linear :—
Leaves not markedly distichous, flat, not rigid or glaucous :—
Glumes equal, ·07–·11 in. long, obtuse. Culms 1–3 ft. high; leaves 2–3·2 in. long, ·2–·4 in. wide, closely ribbed; spikelets ·08–·12 in. long, upper lemma ·06 in. long..........1. *oreades.*
Lower glume shorter than the upper :—
Spikelets ·06–·08 in. long. Culms 1–12 in. high; leaves 1–6 in. long, very narrow; lower lemma distinctly shorter than the upper glume, not much longer than the upper lemma ....2. *humile.*
Spikelets ·085 in. or more long :—
Spikelets ·2–·26 in. long. Culms 1–4 ft. high, softly hirsute below the nodes; leaves tapering from a broad base, 4–14 in. long, ·25–·8 in. wide, sheaths with long spreading hairs from conspicuous tubercles; upper lemma ovate, ·13–·15 in. long, brown, shining, usually with 5 pale-brown nerves ....3. *miliaceum.*
Spikelets ·16 or less long :—
Upper lemma smooth :—
Annuals; nodes of culms glabrous :—
Spikelets not gaping; keel of glumes not scaberulous; upper lemma acute or subacute :—
Panicles contracted, branches and pedicels moderately slender. Culms 1–2 ft. long; leaves tapering from a broad base, 3–12 in. long, ·15–·5 in. wide (in cultivated forms sometimes much larger, stout, up to 3 ft. high; leaves up to 2 ft. long and 1 in. wide); spikelets ·13–·17 in. long; lower glume ·04–·09 in. long; upper lemma ·08–·12 in. long, dark brown at maturity, often with 5 paler veins ....4. *miliare.*
Panicles effuse; branches and pedicels capillary. Culms slender, 6–22 in. high; leaves not tapering, 2–8 in. long, ·25–·35 in. wide; spikelets ·1–·12 in. long; lower glume ·03–·05 in. long; upper lemma ·06–·08 in. long, pale brown or whitish
5. *psilopodium.*
Spikelets gaping, ·11–·15 in. long; upper lemma obtuse, ·07–·11 in. long, yellow. Culms 6–36 in. high; leaves usually basal only, not tapering, 1·3–13 in. long, ·12–·4 in. long, copiously hairy from

tubercles, rarely glabrous; panicles often large; lower glume ·05–·1 in. long, cuspidate, keel scaberulous [6. *trypheron.*

Perennials :—

Lower glume broader than long, obtuse, ¼ as long as the spikelets or less. Culms stout, 2–3 ft. high, base creeping or floating and rooting at the lower nodes, nodes glabrous; leaves tapering, 4–11 in. long, ·25–·4 in. wide, sheaths inflated; pedicels scabrid, usually much enlarged at the apex; spikelets lanceolate, ·12–·16 in. long . . 7. *paludosum.*

Lower glumes ovate, acuminate, ½–¾ as long as the spikelets. Culms solid, terete, woody below, up to 6 ft. high, nodes thickened, puberulous; leaves very finely acuminate, 6–24 in. long, ·25–·8 in. wide, sheaths not inflated; panicles large, pedicels slender, not enlarged at the apex; spikelets ovoid, acute, ·12–·13 in. long . . . . 8. *antidotale.*

Upper lemma transversely rugulose, ·08–·1 in. long. Culms usually stout, up to 10 ft. high; nodes hirsute; leaves tapering from a broad, rounded or cordate base, 6–24 in. long, ·35–·8 in. wide, margins spinulose; lowest node of the panicle villous; spikelets ·11–·16 in. long; lower glume suborbicular, ·04–·06 in. long . . 9. *maximum.*

Leaves distichous, involute, seldom expanded, rigid, glabrous, 2·5–13 in. long, ·15–·3 in. wide. Culms creeping at the base, stoloniferous, often nodular, 1–5 ft. high, sterile shoots closely leafy; spikelets ·1–·13 in. long; lower glume suborbicular, ·04–·05 in long . . . . 10. *repens.*

Leaves ovate to lanceolate :—

Spikelets ·13 in. or less long :—

Leaves ovate, acute, base cordate, amplexicaul, 1–3·2 in. long, ·5–1·2 in. wide. Culms decumbent and rooting below, up to 3 ft. long; spikelets ·07–·09 in. long; glumes glabrous, puberulous or sometimes pilose from tubercles, upper gibbous, ·06–·08 in. long, very slightly longer than the lower; lower lemma about as long, upper very little shorter than the lower glume 11. *brevifolium.*

Leaves lanceolate, acuminate, base broad, deeply cordate, 3·5–8·5 in. long, ·4–1·2 in. wide. Culms erect, up to 6 ft. high, base shortly woody; spikelets ·1–·13 in. long; upper glume not gibbous, subequal to the lower lemma, a little longer than the lower glume and upper lemma . . . . 12. *montanum.*

Spikelets ·16–·22 in. long. Culms slender, up to 5 ft. high; leaves ovate-lanceolate, acuminate, base rounded or cordate, 2·5–7 in. long, ·35–1 in. wide; upper glume and lower lemma subequal, larger than the lower glume and upper lemma . . 13. *Gardneri.*

Glumes minute or one or both absent. Culms slender, up to 3 ft. high; leaves 2·5–8 in. long, ·15–·53 in. wide; panicles large, effuse, branches and pedicels capillary; spikelets ·1 in. long; lower lemma 5–7-nerved, glabrous or silky between the nerves, enfolding the slightly shorter upper . . . . 14. *subeglume.*

1. Panicum oreades, Domin *P. aequiglume*, Hook. f. non Hack. et Arechav.; F. B. I. vii. 44.
 Nilgiri Hills at 5,000 ft. (Lawson, Bourne).
2. Panicum humile, Nees; F. B. I. vii. 48.
 Vizagapatam and S. Kanara Districts; Travancore State.
 Considered a good fodder in N. India.
3. Panicum miliaceum, Linn.; F. B. I. vii. 45.
 Cultivated for its edible grain. The common Millet.
 The straw is a useful fodder. Vern. *Hind.* Chena; *Ur.* Rala; *Tel.* Varagalu, Wuragi, Warigalu, Barigalu; *Tam.* Samai, Kadai-kanni; *Kan.* Baragu.
4. Panicum miliare, Lamk.; F. B. I. vii. 46.
 Much cultivated in all Districts for its edible grain and run wild; sea-level to 7,000 ft. The little Millet.
 The straw is a good fodder. Vern. *Hind.* Savan; *Ur.* Suniva; *Tel.* Chamalu, Ganga samalu, Sani, Savai; *Tam.* Samai, Shamai, Peru samai; *Kan.* Shamai, Bili samai hullu; *Mal.* Shama.
5. Panicum psilopodium, Trin.; F. B. I. vii. 46.
 In all Districts; sea-level to 6,000 ft.
 Not easily distinguished from the last species, of which it is probably the truly wild form. In salt swamps the whole plant becomes rather stiff, with narrow erect leaves. Vern. *Tam.* Kadaikanai, Piva pillu, Samai, Uragadam, Pattu pillu, Kalam pillu.
 The spikelets are very commonly inhabited by a larva and then they become much hypertrophied, up to ·3 in. long. In normal spikelets occasionally a coriaceous linear ensiform appendage $\frac{1}{3}$–$\frac{2}{3}$ as long as the upper lemma is found attached to the rhachilla between the two lemmas.

6. PANICUM TRYPHERON, Schult.; F. B. I. vii. 47; S. I. G. fig. 101.
   In all Districts; sea-level to 6,000 ft. Vern. *Tel.* Adavi satha gaddi; *Tam.* Samai-karunai; *Kan.* Kadu karai samai hullu.
7. PANICUM PALUDOSUM, Roxb. *P. proliferum*, Hook. f. non Lamk.; F. B. I. vii. 50.
   Ganjam, Cuddapah and Coimbatore Districts; Mysore State; Lower Pulney Hills; Courtallam; sea-level to 3,000 ft.
8. PANICUM ANTIDOTALE, Retz.; F. B. I. vii. 52.
   Bangalore; Carnatic; Nilgiri and Shevaroy Hills.
   Grazed by cattle only when young. Used medicinally for ulcers (*fide* Koenig), and in throat affections; the smoke when it is burnt is said to be a disinfectant. Vern. *Tam.* Nassiam pillu, Pinisu pillu.
9. PANICUM MAXIMUM, Jacq.; F. B. I. vii. 49.
   A tropical African grass cultivated for its valuable fodder and occasionally found as an escape. The Guinea grass. Vern. *Hind.* Gini ghans; *Tam.* Ginio pillu; *Kan.* Gini hullu.
10. PANICUM REPENS, Linn.; F. B. I. vii. 49; S. I. G. figs. 102, 103.
    In all Districts; in sandy soil or in standing, including brackish, water; sea-level to 7,000 ft. The Ginger grass.
    Much liked by cattle and alleged to stimulate the yield of milk. Vern. *Ur.* Reda; *Tel.* Ladda gaddi, Kari gaddi; *Tam.* Tinei pillu, Inji pillu; *Mal.* Inchi kanu pullu; *Kan.* Sonti hullu.
11. PANICUM BREVIFOLIUM, Linn. *P. ovalifolium*, Poir.; F. B. I. vii. 44.
    In all Districts; sea-level to 3,500 ft.
12. PANICUM MONTANUM, Roxb.; F. B. I. vii. 53.
    In all Districts; sea-level to 4,000 ft.
13. PANICUM GARDNERI, Thw. *Isachne Gardneri*, Benth.; F. B. I. vii. 26.
    W. Ghâts; 5,000–7,500 ft.
14. PANICUM SUBEGLUME, Trin.; F. B. I. vii. 51.
    In all the Eastern Districts from the Rampa Hills to Tinnevelly; sea-level to 2,000 ft.

59. Hymenachne, Beauv.

Stout, erect herbs. *Leaves* broadly linear. *Inflorescence* a thyrsoid panicle with erect, appressed branches; branchlets spiciform. *Spikelets* very numerous, secund, narrowly lanceolate, acuminate, articulated on minute pedicels; rhachilla produced between the glumes and between the upper glume and the lower lemma. *Glumes* membranous; the lower shorter, cuspidate, keeled; the upper sheathing the rhachilla, prominently 3-nerved, cuspidate or awned. *Lemmas* longer than the upper glumes; the lower membranous, lanceolate, tapering into an arista, 5-nerved, empty; the upper shorter, oblong, membranous in flower, hardening in fruit, faintly 2-nerved, embracing its palea except at the tip, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* very small, oblong, tip contracted; embryo large, orbicular.

HYMENACHNE PSEUDO-INTERRUPTA, C. Muell. *Panicum Myurus*, H. B. K.; F. B. I. vii. 39.

Near the coast line; not common.

Root stock creeping or floating; culms erect, 2–6 ft. high, rooting at the lower nodes, spongy below; leaves 3·5–18 in. long, ·3–·75 in. wide, base rounded or cordate; panicle 4·5–12 in. long; spikelets ·16–·2 in. long; glumes and lower lemma scaberulous on the ribs; upper glume strongly 3-ribbed, acuminate-caudate, ·15 in. long; lower lemma ·18–·2 in. long, tapering into an arista $\frac{1}{3}$ as long; upper lemma ·12–·13 in. long.

60. Cyrtococcum, Stapf

Perennial, usually weak herbs. *Leaves* usually narrow, sometimes ovate, flat. *Panicles* effuse or contracted. *Spikelets* long- or short-pedicelled, distant or approximate, obliquely obovate to semi-obovate, much laterally compressed. *Glumes* thinly membranous, unequal or subequal. *Lemmas* dissimilar; the lower similar to the upper glume, its palea, if present, narrow, 2-nerved, empty; the upper narrowly boat-shaped, papery to subcrustaceous with firm, narrowly involute margins, as long as the lower or

nearly so, its palea subequal to it, narrowly convex on the back, with fine keels and thin flaps, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* small, obovoid, free within the hardened lemma and palea.

Pedicels short, rarely as long as the spikelets :—
  Leaves ·5–1·7 in. long, ·1–·4 in. wide. Culms slender, creeping and branching below, up to 18 in. high ; panicle up to 2·5 in. long, branches few ; spikelets few, hispid, ·06–·07 in. long . . 1. *trigonum*.
  Leaves 2–7·5 in. long, ·2–·65 in. wide. Culms rather stout, erect from a creeping base, up to 3 ft. high ; panicle 2·5–8·5 in. long, branches many ; spikelets numerous, glabrous, rarely softly puberulous, ·07–·09 in. long . . . . 2. *oxyphyllum*.
Pedicels long, usually longer than the spikelets :—
  Upper lemma semi-ovate, with a linear or oblong apical pale callus, its palea usually with a small round apical callus ; glumes more or less keeled :—
    Lower lemma obtuse ; glumes usually puberulous or hispidulous ; panicles effuse, simply branched :—
      Spikelets ·09–·1 in. long ; upper lemma semi-ovate. Culms slender, erect from a creeping, rooting base, 5–12 in. long ; leaves linear to linear-lanceolate, 1–4 in. long, ·2–·35 in. wide 3. *patens*.
      Spikelets ·06–·08 in. long ; upper lemma broadly semi-ovate. Culms up to 18 in. high ; leaves ovate to lanceolate, 1–3 in. long, ·2–·65 in. wide. Other characters as in the last species 4. *radicans*.
    Lower lemma and *glabrous glumes acute* or *cuspidate*. Culms rather robust, up to 3 ft. high from a decumbent base ; leaves 3–8 in. long, ·25–·6 in. wide ; panicles up to 1 ft. long, fastigiately branched ; spikelets ·08–·09 in. long, less compressed than in any of the previous species . . . . 5. *longipes*.
  Upper lemma semi-lanceolate, acute, without apical callus, its palea without callus ; glumes not keeled. Culms very slender, up to 18 in. high ; leaves 1–2·7 in. long, up to ·3 in. wide ; panicles laxly effuse, branches and pedicels capillary ; spikelets distant, ·05–·07 in. long . . . . 6. *sparsicomum*.

1. Cyrtococcum trigonum, A. Camus. *Panicum trigonum*, Retz. ; F. B. I. vii. 56.

In all Districts ; up to 3,000 ft. Usually in shade. Vern. *Kan.* Abbu karkai.

2. CYRTOCOCCUM OXYPHYLLUM, Stapf. *Panicum-pilipes*, Nees et Arn.; F. B. I. vii. 57.
   In all Districts; sea-level to 6,000 ft. In open grass lands and woods and in evergreen forest.

3. CYRTOCOCCUM PATENS, A. Camus. *Panicum patens*, Linn.; F. B. I. vii. 57 in part.
   Nilgiri, Pulney and High Wavy Mountains; 4,000–6,000 ft.

4. CYRTOCOCCUM RADICANS, Stapf. *Panicum patens*, Linn.; F. B. I. vii. 57 in part.
   Mysore State; W. Coast and Gháts; N. Coimbatore Hills; sea-level to 6,000 ft.
   Grazed by cattle. Vern. *Kan.* Akki hullu.

5. CYRTOCOCCUM LONGIPES, A. Camus. *Panicum longipes*, W. et A.; F. B. I. vii. 58.
   Godavari District at Bison Hill (Barber); Mysore State; W. Coast and Gháts; 2,000–5,000 ft.

6. CYRTOCOCCUM SPARSICOMUM, A. Camus. *Panicum sparsicomum*, Nees; F. B. I. vii. 58.
   Kodaikanal Ghát, about 2,000 ft. (Bourne).

61. Saccolepis, Nash

Perennial, or sometimes annual herbs. *Leaves* linear, flat or convolute and filiform. *Panicles* effuse or contracted and spiciform. *Spikelets* often small, ovate oblong to conico-lanceolate, subterete or compressed, sometimes more or less oblique, usually somewhat turgid; pedicels filiform. *Glumes* unequal; the lower minute or up to half as long as the spikelet; the upper always very convex, often with a saccate base, 5–13-ribbed. *Lemmas* dissimilar; the lower about half as long as the upper, with a straight back, its palea hyaline, finely 2-keeled, sometimes reduced or rudimentary, empty or containing a ♂ floret; the upper very convex, chartaceous, becoming crustaceous, margins narrowly involute, obscurely 5-nerved, its palea of the same texture and almost as long, tightly embraced by it, hardly keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed in the hardened lemma and palea, elliptic, dorsally compressed, almost plano-convex in section; embryo about half as long.

Panicles cylindric, spiciform; pedicels short:—

Lower glume less than ⅓ as long as the spikelet. Culms usually robust and spongy below, up to 6 ft. high; leaves 6–15 in. long, ·2–·5 in. wide; pseudo spikes 5–13 in. long (in impoverished individuals only 1 in. long); spikelets usually in interrupted, crowded fascicles, narrowly ovoid, ·14–·19 in. long, glabrous . . 1. *interrupta.*

Lower glume half as long as the spikelet: pseudo spikes continuous, rarely interrupted:—

Spikelets ovoid, usually curved, ·08–·13 in. long, glabrous or more or less densely hispid. Culms slender, 4–24 in. high; leaves 1·2–5·6 in. long, ·06–·2 in. wide; pseudo spikes ·35–3·5 in. long 2. *indica.*

Spikelets subglobose, ·06–·08 in. long, glabrous. Culms slender, 6–22 in. high; leaves 4–14 in. long, ·05–·2 in. wide; pseudo spikes 1·4–10 in. long . . . . 3. *myosuroides.*

Panicles broad, effuse, up to 4 in. long; pedicels capillary, often longer than the spikelets. Culms slender, 6–20 in. high; leaves 1·5–4 in. long, ·1–·22 in. wide; spikelets gibbously ovoid, ·09–·11 in. long, glabrous . . . . 4. *curvata.*

1. SACCOLEPIS INTERRUPTA, Stapf. *Panicum interruptum*, Willd.; F. B. I. vii. 40; S. I. G. figs. 99, 100.

   In all Districts; sea-level to 6,000 ft. In swampy places. Grazed by cattle. Vern. *Tel.* Wolam; *Tam.* Tandan pillu; *Kan.* Hodikai hullu.

2. SACCOLEPIS INDICA, Chase. *Panicum indicum*, Linn.; F. B. I. vii. 41.

   In all Districts; sea-level to 6,500 ft. Vern. *Kan.* Kari korlai hullu.

3. SACCOLEPIS MYOSUROIDES, A. Camus. *Panicum myosuroides*, R. Br.; F. B. I. vii. 42.

   Ganjam District; Mysore State; Carnatic; sea-level to 3,000 ft.

   Doubtfully separable from the last species.

4. SACCOLEPIS CURVATA, Chase. *Panicum curvatum*, Linn.; F. B. I. vii. 42.

   Chingleput and Tinnevelly Districts; Travancore; up to 6,000 ft.

   In marshes and in hedges. A good fodder.

62. Setaria, Beauv.

Annual or perennial herbs. *Leaves* narrow, flat. *Panicles* terminal, contracted and cylindric with solitary or clustered spikelets on stunted branchlets which are more or less produced into bristles or divided into a one-sided involucre of bristles, or more or less open panicles with elongated branches and distant spikelets, the bristles present or not. *Spikelets* oblong to ovate, very convex on the back, falling entire, subtended by 1–many bristles. *Glumes* membranous; the lower usually ovate from a clasping base; the upper similar but longer. *Lemmas* dissimilar; the lower corresponding in size and shape with the spikelet, its palea elliptic-oblong, acute, sharply keeled or the keels marginate and narrowly winged, sometimes much reduced, empty or enclosing a ♂ floret; the upper subequal to the lower, very convex on the back or boat-shaped, crustaceous, often transversely rugose or finely pitted, its margins involute and embracing all along the similar palea up to its more or less prominent keels, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong or ellipsoid, tightly enclosed in the hardened lemma and palea.

Leaves plicate, 4–24 in. long, ·4–3 in. wide. Perennial; culms erect from a woody rootstock, up to 8 ft. high; panicles usually long, contracted or expanded, up to 2 ft. long, sometimes reduced and subspiciform; branchlets usually ending in a bristle; spikelets ovate-lanceolate, acute or acuminate, ·1–·15 in. long; upper lemma faintly transversely striate .... 1. *palmifolia.*

Leaves flat, not plicate. Annuals :—

Bristles barbellate with erect teeth :—

Upper lemma smooth or faintly transversely striate. Culms up to 5 ft. high; leaves tapering to a long fine point, 6–18 in. long, ·4–1·4 in. wide; panicles dense, forming a cylindric, sometimes lobed, continuous pseudo spike up to 12 in. long; branches spiral or more or less whorled; bristles 2–6; spikelets subpersistent, broadly oblong or elliptic, ·08–·11 in. long ....2. *italica.*

Upper lemma distinctly transversely rugose :—

Panicles continuous, cylindric, ·3–6·5 in. long; bristles about 8. Culms up to 40 in. high; leaves 2·5–13 in. long, ·15–·4 in. wide; spikelets deciduous, ovate to elliptic-oblong; ·09–·12 in. long .... 3. *pallidifusca.*

Panicles narrow, interrupted, lax, flexuous, 1·5–8 in. long,

branches ending in a bristle, lower up to 1 in. long; involucral bristles 3–4. Culms slender, up to 3 ft. high; leaves flaccid, 2–12 in. long, ·12–·7 in. wide; spikelets broadly ovate, ·07–·08 in. long .... 4. *intermedia*.

Bristles barbellate with descending teeth. Culms up to 4 ft. high; leaves 3·5–14·5 in. long, ·2–1 in. wide; panicles straight or curved, continuous, cylindric, ·5–8 in. long; branches ending in a bristle: involucral bristles 1–4; spikelets oblong-ellipsoid, ·07–·08 in. long 5. *verticillata*.

1. SETARIA PALMIFOLIA, Stapf. *Panicum plicatum*, Lamk.; F. B. I. vii. 55.

   In all Districts, especially in the hills; near sea-level to 6,000 ft.

2. SETARIA ITALICA, Beauv.; F. B. I. vii. 78.

   Widely cultivated and occasionally found as an escape. The Italian Millet. Probably the cultivated form of *S. intermedia*, R. et S. Vern. *Hind.* Kangu; *Ur.* Kangu; *Tel.* Kora, Koralu; *Tam.* Tenai; *Mal.* Tena; *Kan.* Kari biragu, Navanai.

3. SETARIA PALLIDIFUSCA, Stapf et Hubbard. *S. glauca*, Beauv.; F. B. I. vii. 78 *in part.*; S. I. G. fig. 109.

   In most Districts; sea-level to 7,000 ft.

   Panicles pale-yellow to reddish-brown. A fair fodder. Vern. *Hind.* Bandra; *Tel.* Nakka kora, Kuradakori gaddi, Nakka-toka gaddi.

4. SETARIA INTERMEDIA, Roem. et Sch.; F. B. I. vii. 79; S. I. G. fig. 110.

   In all Districts; 2,000–6,000 ft. Vern. *Tel.* Arranki gaddi; *Kan.* Dodda anta purlai hullu, Kari ottai hullu.

5. SETARIA VERTICILLATA, Beauv.; F. B. I. vii. 80; S. I. G. figs. 111, 112.

   In all Districts; up to 6,000 ft.

   The grain is eaten by the poor; eaten by cattle before the spikes appear. Vern. *Tel.* Chik lenta; *Kan.* Sanna anta purlai hullu.

63. Pseudoraphis, Griffith

Floating or marsh herbs, usually elongate, much branched and rooting at the lower, geniculate nodes. *Leaves* narrow, flat.

Panicles terminal, contracted or effuse, the branchlets produced beyond the uppermost spikelet. *Spikelets* narrow, obscurely articulated on the short pedicels, persistent. *Glumes* very unequal; the lower very small, thinly membranous; the upper as long as the spikelet or nearly so. *Lemmas* smaller and rather firmer than the upper glume; the lower containing a ♂ floret; the upper a bisexual or a ♀; paleas hyaline, cuneiform. *Lodicules* 2, sometimes only 1 in ♀ florets. *Stamens* 3, rudimentary in ♀ florets. *Styles* 2, shortly united at the base. *Grain* linear-oblong, compressed, free within the subcoriaceous lower and the hyaline upper lemmas.

PSEUDORAPHIS ASPERA, Pilger. *Chamaeraphis spinescens*, Poir.; F. B. I. vii. 62; S. I.-G. fig. 104.

Kistna, Cuddapah, Coimbatore and Chingleput Districts; Mysore State; near sea-level to 4,000 ft. (Horsleykonda). Growing in tanks and marshes.

Culms up to 3 ft. long; leaves 1·2–3 in. long, ·1–·22 in. wide, scaberulous; panicles contracted, ultimately effuse, up to 4·5 in. long, branches flattened, undulate, scabrid, the prolongation usually overtopping the uppermost spikelet; spikelets distant, subulate, acuminate, ·23–·31 in. long; upper glume caudate.

64. Rhynchelytrum, Nees.

Annual or perennial herbs. *Leaves* linear or filiform, flat. *Panicles* compound or decompound, open or contracted, branches and pedicels capillary, the latter discoid and usually hairy or pubescent at the tips. *Spikelets* linear- to ovate-oblong, laterally compressed, often more or less gaping, usually clothed with soft, shining, often brightly coloured hair. *Glumes* usually separated; the lower minute or small, rarely $\frac{1}{3}$ as long as the spikelet; the upper as long as the spikelet or nearly so, emarginate or 2-lobed, rarely entire, muticous, mucronate or aristate from the sinus. *Lemmas* dissimilar; the lower resembling the upper glume, usually aristate, its palea 2-keeled, usually containing a ♂ floret; the upper much smaller and not aristate, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong-ellipsoid, closely embraced by the lemma and palea.

RHYNCHELYTRUM VILLOSUM, Chiov. *Tricholaena Wightii*, Nees et Arn.; F. B. I. vii. 65.

Kurnool (Bourne) and Bellary Districts; Bangalore ("weed in a garden," Sedgwick); 1,000–3,000 ft.

Culms up to 2 ft. high; leaves 1–6 in. long, ·1–·25 in. wide; panicles up to 6 in. long; spikelets ·19–·24 in. long, excluding aristas; lower lemma 2-lobed, its arista ·07–·14 in. long with very long whitish or pinkish-purple hairs on the back.

65. Pennisetum, L. C. Rich.

Annual or perennial, erect, often tall, simple or branched herbs. *Leaves* narrow, flat or convolute. *Panicles* spiciform, usually dense, branches numerous, short and simple with a solitary spikelet or scantily divided and the spikelets in clusters of 2–5, the single ones or clusters subtended by and deciduous with an involucre of few to many, free, usually unequal, scabrid or plumose, simple, rarely branched bristles. *Glumes* usually small and hyaline; the lower sometimes suppressed; the upper rarely more than half as long as the spikelet. *Lemmas* similar and subequal or dissimilar and the upper smaller, membranous to chartaceous; the lower empty or enclosing a ♂ floret; the upper containing a bisexual floret; paleas subequal and similar to the lemmas, the lower sometimes suppressed. *Lodicules* 2, small or 0. *Stamens* 3; anthers sometimes penicillate at the tip. *Styles* 2, free or more or less connate. *Grain* narrowly oblong to orbicular, enclosed in the slightly hardened lemma and palea; embryo $\frac{1}{2}$–$\frac{3}{4}$ as long.

Sometimes the spikelets are much reduced (especially in cultivated forms), even to an upper floret with only minute traces of a lower lemma.

Leaves expanded:—

Panicles cylindric, stout, 1·8–9 in. long; rhachis thick, villous; peduncles villous, ·05–·09 in. long; involucres densely packed all round the rhachis, often purplish, bristles sometimes ciliate, up to ·2 in. long. Culms stout, up to 6 ft. high; leaves 4–24 in. long, ·2–1·5 in. wide; spikelets 2, rarely 3, to an involucre, pedicelled, ·13–·17 in. long; lower glume usually 0, upper very short or 0; lemmas subequal, lower sometimes suppressed, ·12–·14 in. long; anther-tips penicillate.............................1. *typhoides.*

Panicles linear, slender, 1–8 in. long; rhachis slender, angled, flexuous, glabrous or puberulous; involucres sessile, spirally arranged at short intervals; spikelets usually solitary, rarely 2 in an involucre. Culms stout, up to 3 ft. high; leaves 3–15 in. long, ·2–·6 in. wide; anthers not penicillate:—

Inner bristles densely villous, longest up to ·65 in. long; pedicels up to ·07 in. long; lower glume ·05–·07 in. long, more or less villous, upper ·15–·17 in. long, acute, puberulous; lower lemma like the upper glume, 3-toothed at apex, upper chartaceous ·09–·11 in. long, its apex and that of its palea fimbriate 2. *pedicellatum*.

Inner bristles laxly ciliate, longest up to ·5 in. long; spikelets sessile; lower glume minute or suppressed. Other characters as in the last species........................3. *polystachyon*.

Leaves convolute, 3–30 in. long, very narrow; panicles linear; spikelets solitary, sessile; anthers not penicillate. Culms up to 3 ft. high:—

Panicles 3–7 in. long; involucres subsessile, bristles scabrid, not plumose, up to ·74 in. long, often purplish; spikelets ·27–·32 in. long; lower glume orbicular ·04 in. long, upper ovate, ·08–·15 in. long; lower lemma ·24–·29 in. long.............4. *Hohenackeri*.

Panicles 1–4·5 in. long; peduncles up to ·05 in. long; bristles plumose, up to 2·5 in. long, sometimes purplish; spikelets ·45–·55 in. long; lower glume oblate, ·02–·04 in. long, upper lanceolate to oblong, ·14–·2 in. long; lemmas ·3–·4 in. long ......5. *villosum*.

1. PENNISETUM TYPHOIDES, Stapf et Hubbard. *P. typhoideum*, Rich.; F. B. I. vii. 82.

   Cultivated in all Districts for its edible grain and for fodder; here and there found as an escape; near sea-level to 7,000 ft. The Bull-rush Millet, Pearl Millet or Spiked Millet. Vern. *Hind.* Bajra; *Ur.* Gantiya; *Tel.* Sajja, Sajjalu, Gantelu; *Tam.* Kambu; *Mal.* Kampam; *Kan.* Sajjai.

2. PENNISETUM PEDICELLATUM, Trin.; F. B. I. vii. 86.

   Godavari District (Barber).

3. PENNISETUM POLYSTACHYON, Schult. *P. setosum*, Rich.; F. B. I. vii. 87.

   Godavari District (Barber).

4. PENNISETUM HOHENACKERI, Hochst. ex Steud.; *P. alopecuros*, Steud.; F. B. I. vii. 84; S. I. G. figs. 113, 114.

Mysore State; Bellary, N. Arcot, Salem, Madura and Malabar Districts; Nilgiri and N. Coimbatore Hills; 1,000–6,000 ft. Vern. *Tam.* Munja pillu; *Kan.* Nosai hullu, Manai geddai.

5. Pennisetum villosum, R. Br.
Introduced and run wild along road-sides at Ootacamund.
Pennisetum clandestinum, Hochst., the Kikiyu grass, an excellent tropical African fodder grass, is being cultivated in certain areas to improve the grazing. It is reported to be a good lawn grass and is likely to spread.

66. Cenchrus, Linn.

Annual or perennial herbs. *Leaves* flat and flaccid or convolute, short and rigid. *Inflorescence* of simple spikes or panicled. *Spikelets* narrow, solitary or 2–3, rarely 4, enclosed in an involucre of bristles or spines thickened and united at the base into a cup and falling with it. *Glumes* unequal; the lower small; the upper hardly shorter than the spikelet. *Lemmas*, when both present, dissimilar; the lower empty, containing a ♂ floret or entirely suppressed; the upper more rigid, containing a bisexual floret. *Lodicules* 0 or 2, minute. *Stamens* 3. *Styles* 2, often shortly connate. *Grain* oblong, rather hard, enclosed but free within the lemma and palea.

Involucral bristles not spinose, ·3–·5 in. long, the inner plumose, even if thickened below the tips always filiform. Culms up to 18 in. high; leaves 2–12 in. long, ·1–·2 in. wide; spikes 1–3 in. long; lower glume ·07–·11 in. long, upper ·1–·13 in. long .... 1. *ciliaris.*

Involucral bristles spinose, tips not filiform :—

Base of involucre rounded, bristles all erect, not ciliate, hairy within, up to ·16 in. long. Culms up to 12 in. high; leaves 4–5 in. long, ·15 in. wide; spikes ·05–3 in. long; spikelets ·17 in. long; lower glume ·06–·07 in. long, upper slightly longer; lemmas ·13–·16 in. long .... 2. *setigerus.*

Base of involucre turbinate, bristles stout, the outer spreading or recurved, ciliate, up to ·33 in. long. Culms 2–18 in. high; leaves 1–6 in. long, ·2 in. wide; spikes 1·5–5 in. long; spikelets ·22–·26 in. long; lower glume usually suppressed, upper ·14–·2 in. long; lemmas ·15–·23 in. long .... 3. *barbatus.*

1. CENCHRUS CILIARIS, Linn. *Pennisetum cenchroides*, Rich.; F. B. I. vii. 88; S. I. G. fig. 115.
   Mysore State; Anantapur, Bellary, Chingleput, Salem, Coimbatore and Madura Districts; up to 3,000 ft.
   Spikes often purple. An excellent fodder. Attempts are being made to extend it over wider areas. Vern. *Tam.* Kolukkattai pullu.

Var. *echinoides*, Hook. f. *Pennisetum cenchroides*, Rich. var. *echinoides*, Hook, f.; F. B. I. vii. 88; S. I. G. fig. 116. With rather stouter bristles united higher up into a more definite cup.

2. CENCHRUS SETIGERUS, Vahl. *C. biflorus*, Roxb.; F. B. I. vii. 89; S. I. G. fig. 117.
   Coromandel. Not common.
   Spikes sometimes purple.
3. CENCHRUS BARBATUS, Schum. *C. catharticus*, Del.; F. B. I. vii. 90; S. I. G. fig. 118.
   Northern Circars; Bellary District.
   Grazed by cattle before flowering.

67. Isachne, R. Br.

Perennial herbs. *Leaves* flat. *Inflorescence* loosely panicled. *Spikelets* small or minute, subglobose or obovoid, not or obscurely articulated on the pedicels. *Glumes* subequal, convex, herbaceous, often falling separately. *Lemmas* subequal or the lower longer and flatter, coriaceous paleate; the lower containing a ♂ or sometimes a bisexual floret; the upper articulated and often stipitate on the rhachilla and falling separately, containing a bisexual or sometimes a ♀, rarely a ♂ floret. *Lodicules* 2, very minute. *Stamens* 3, rarely 4–6. *Styles* 2, free. *Grain* free within the hardened lemma and palea.

Glumes, at least the lower, longer than the lemmas, cuspidate or caudate :—
  Lemmas subequal :—
    Branches of the panicles glabrous or pubescent; margins of leaves thickened and cartilaginous; glumes lanceolate, sparsely setose at apex :—
      Leaves ovate to ovate-lanceolate, ·6–3·5 in. long, ·2–·5 in. wide (much wider in var. *latifolia*), base rounded and clasping the stem, sheaths more or less densely long-hairy and ciliate.

Culms 3–12 in. high; glumes ·1–·11 in. long; lemmas ·06–·09 in. long, upper more or less pubĕrulous..........1. *Kunthiana.*

Leaves linear to linear-lanceolate, rarely a few narrowly ovate, ·6–2·6 in. long, ·15–·4 in. wide, base narrowed, not clasping the stem, sheaths glabrous, rarely shortly puberulous. Culms 3–40 in. high; glumes ·12–·15 in. long. Other characters as in the last species..........................2. *Bourneorum.*

Branches of the panicles setose; glumes ovate-orbicular, ·09–·11 in. long; setose all over the back. Culms 1–5 in. high; leaves lanceolate, ·7–2 in. long, ·2–·4 in. wide, base clasping the stem, margins neither thickened nor cartilaginous, sheaths long-hairy or nearly glabrous, long-ciliate; lemmas hemispheric, ·06 in. long, glabrous .... 3. *Lisboae.*

Lower lemma elliptic, ·08–·09 in. long, glabrous, upper broadly ovate, ·04–·06 in. long, rather densely pubescent. Culms slender, 1–5 in. high; leaves ovate to ovate-lanceolate, ·4–1·2 in. long, ·15–·4 in. wide, sheaths lax, patently hairy from tubercles; glumes ovate, caudate-acuminate, 7-nerved, setose from large tubercles, ·09–·12 in. long, lower usually the longer................4. *setosa.*

Glumes as long as or shorter than the lemmas:—

Spikelets ·12 in. or less long:—

Leaves 6·5 in. or less long:—

Stems erect or prostrate, 25 in. or less high:—

Spikelets ·07–·12 in. long; ligules represented by a line of stiff hairs:—

Lemmas subequal and similar, ovate to elliptic-oblong, rather deeply concave, subcoriaceous, puberulous, ·06–·09 in. long. Culms decumbent, rooting below, up to 24 in. high; leaves asperulous, sometimes softly hairy, 2–5·5 in. long, ·2–·25 in. wide, usually more or less erect; glumes subequal, broadly ovate to orbicular, glabrous or asperulous and setose upward, ·07–·11 in. long .... 5. *elegans.*

Lemmas markedly unequal and dissimilar, lower elliptic to oblong, shallowly concave, glabrous, membranous:—

Culms prostrate, slender, up to 12 in. long; leaves 1·2–2·3 in. long, ·15–·3 in. wide; glumes suborbicular or broader than long, ·05–·09 in. long, upper much more deeply concave, glabrous, sometimes asperulous and setulose at the apex; lower lemma as long, upper broadly ovate to suborbicular, semicircular in section, chartaceous, puberulous at least on the margins, ·04–·07 in. long...............................6. *miliacea.*

Culms erect from a decumbent, rooting base, rigid, up to 12 in. long; leaves 1–2·5 in. long, ·15–·4 in. wide; glumes as in the last species; lower lemma ·06–·1 in. long, upper crustaceous, hard, usually white, puberulous at least on the margins, ·05–·08 in. long......7. *dispar.*

Spikelets ·04 in. long; ligules 0. Culms 1·5–7 in. high, very slender; leaves ovate, ·35–1·5 in. long, ·2–·5 in. wide, flaccid; glumes delicately membranous, elliptic to elliptic-ovate, sparsely setose, ·03–·04 in. long..........8. *gracilis.*

Culms straggling, bamboo-like, 4 ft. or more long; leaves 2–6 in. long, ·12–·25 in. wide, ciliate at base; glumes broadly elliptic-ovate, ·08–·1 in. long; lemmas boat-shaped, ·07–·08 in. long...................................... 9. *Angladei.*

Leaves 7–14 in. long, ·2–·4 in. wide, continuous with the sheath, beset with stiff short or long hairs, margins thickened and cartilaginous. Culms erect, rigid, up to 3 ft. high; spikelets globose; glumes suborbicular, sparsely setose at apex, ·08–·1 in. long; lemmas orbicular, ·06–·07 in. long..............10. *Meeboldii.*

Spikelets ·14 in. or more long. Culms often stout, 1–5 ft. high; leaves 2–11·5 in. long, ·2–1 in. wide; glumes subequal, ovate to ovate-lanceolate, ·14–·2 in. long, glabrous or setulose; lemmas subequal, boat-shaped, ·12–·15 in. long, coriaceous....11. *Walkeri.*

1. Isachne Kunthiana, W. et A.; F. B. I. vii. 21.

W. Ghâts; High Wavy Mountains (Blatter and Hallberg); 5,000–8,000 ft.

Var. *latifolia*, Hook f.; F. B. I. vii. 22. Leaves up to 1 in. wide with 2–4 nerves on either side of the midrib prominent below.

W. Ghâts; 5,000–8,000 ft.

Var. *nana*, C. E. C. Fischer n. var.

Culms only 1–2 in. high; leaves ·1–·25 in. long, ·05–·1 in. wide, margins not cartilaginous; glumes longer than, equal to or rarely shorter than the lower lemma.

Travancore on Anaimudi Peak at 8,840 ft. (Barnes).

2. Isachne Bourneorum, C. E. C. Fischer in Kew Bull. 1932, 324.

Bababudan, Nilgiri and Pulney Hills; 5,000–8,000 ft.; Travancore on Anaimudi Peak at 8,840 ft. (Barnes).

3. Isachne Lisboae, Hook. f.; F. B. I. vii. 22.

Bababudan Hills (Talbot, Meebold); 6,000 ft.

4. Isachne setosa, C. E. C. Fischer in Kew Bull. 1932, 247.
   Cochin and Travancore States (Meebold); 3,000–6,000 ft.
5. Isachne elegans, Dalz.; F. B. I. vii. 23.
   Mysore, Nilgiri and Pulney Hills; 5,000–7,000 ft. Vern. *Kan.* Kadu sanna samai hullu.
6. Isachne miliacea, Roth; F. B. I. vii. 25.
   Godavari District; W. Coast; at low elevations; usually in wet places.
7. Isachne dispar, Trin.; F. B. I. vii. 26. *I. australis*, Hook. f. non R. Br.; F. B. I. vii. 24.
   In all Districts; sea-level to 6,000 ft.; often in wet situations. Readily eaten by horses and cattle. A troublesome weed in rice-fields.

Var. *villosa*, C. E. C. Fischer n. var.

Nodes setose; leaves villous.

High Wavy Mountains (Blatter and Hallberg).

8. Isachne gracilis, C. E. Hubbard in Kew Bull. 1927, 77.
   Bababudan Hills at Santaveri (Meebold); 4,000 ft.
9. Isachne Angladei, C. E. C. Fischer in Kew Bull. 1932, 323.
   Pulney and High Wavy Mountains; 4,000–6,000 ft.
10. Isachne Meeboldii, C. E. C. Fischer in Kew Bull. 1932, 323.
    Mysore State (Meebold); 2,000–3,000 ft.
11. Isachne Walkeri, W. et A.; F. B. I. vii. 26.
    W. Ghâts; 2,500–7,000 ft.

68. Thysanolaena, Nees

Tall, reed-like shrubs with solid, terete culms. *Leaves* distichous, broad, flat. *Panicles* compound, large, effuse. *Spikelets* very numerous, linear-oblong, obscurely articulated on their pedicels. *Glumes* membranous, much shorter than the lemmas, the lower shorter than the upper. *Lemmas* similar; the lower without palea, empty; the upper paleate, containing a bisexual floret. *Lodicules* 2. *Stamens* 2–3. *Styles* 2, free. *Grain* minute, enclosed in the hardened lemma and palea.

Thysanolaena maxima, O. Ktz. *T. Agrostis*, Nees; F. B. I. vii. 61.
Ganjam, Vizagapatam and Rampa Districts; 1,500–4,800 ft.
Culms up to 12 ft. high; leaves subcoriaceous, finely acuminate, cordate, up to 2 ft. long and 3 in. wide; panicle up to 3 ft. long and 2 ft. across; spikelets ·07–·09 in. long; lower glume

·02–·03 in. long, upper ·04–in. long; lemmas lanceolate, boat-shaped, acuminate, ·06–·07 in. long, the upper the shorter, ciliate with long spreading hairs.

69. Arundinella, Raddi

Annual or perennial, erect herbs. *Leaves* usually narrow. *Panicles* usually branched, rarely congested. *Spikelets* 1–2-, rarely 3-flowered, not or imperfectly jointed at the base; rhachilla not produced beyond the uppermost floret, disarticulating above the glumes. *Glumes* membranous, chartaceous or thinly coriaceous, more or less convex; the lower usually much the shorter, 3–5-, rarely 7-nerved. *Lemmas* dissimilar; the lower usually boat-shaped, 3–7-nerved, its palea linear or oblong, 2-keeled, empty or enclosing a ♂ or a bisexual floret; the upper much shorter, usually chartaceous or crustaceous, articulated at the base and more or less separately caducous, involute, entire or 2-toothed, sometimes provided with two apical setae, usually long awned from the apex or sinus, the awn sometimes very short or absent, geniculate and hygroscopically contorting below the middle, the palea of similar texture, enclosed in the lemma, 2-keeled with wide inflexed flaps (palea sometimes lacking in either or both lemmas), containing usually a bisexual, seldom a ♀ floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free or very shortly united. *Grain* oblong or ellipsoid, free within the lemma and palea; embryo large; albumen rather hard.

Upper lemma awned, hairy at the base; glumes narrow:—
  Upper lemma bearing 2 apical setae:—
    Inflorescence congested into a crowded ovoid or oblong head ·4–1·7 in. long. A weak annual 1–12 in. high; leaves linear to lanceolate, cordate, 1–2 in. long; lower glumes ·16–·22 in. long, setose; upper lemmas ·16–·22 in. long, pilose, awns ·3–·35 in. long, portion below the knee flat.................... 1. *avenacea.*
    Panicle of distant spikes or effuse; leaves linear; upper lemma scaberulous:—
      Spikelets mostly sessile or very shortly pedicelled, bifariously imbricate in spikes ·2–1·5 in. long. Culms slender, 10–24 in. high; leaves 1·4–5·5 in. long, ·05–·32 in. wide; panicles up to 5 in. long; glumes bristly from tubercles; upper lemmas ·07–·15 in. long, awns ·2–·35 in. long.......... 2. *mesophylla.*
      Spikelets slenderly pedicelled, not bifarious or imbricate.

Culms slender to rather stout, 1–3 ft. high; leaves 3–11 in. long, ·1–·3 in. wide; panicles 3–12 in. long: glumes glabrous or setose, ribs often scabrid; upper lemma ·08–·12 in. long, awns ·25–·37 in. long; setae ·06–·14 in. long........3. *setosa.*

Upper lemma devoid of setae :—

Spikelets small; upper lemma less than ·06 in. long :—

Both glumes ·07 in. or less long, smooth, glabrous or rarely with a few hairs. A slender annual 4–15 in. high; leaves 4–9 in. long, ·15–·82 in. wide; panicles effuse, feathery, 5–8 in. long; upper lemmas ·03–·04 in. long, scaberulous, awns ·08–·11 in. long, very slender....................4. *pumila.*

Glumes usually, upper always, more than ·07 in. long, ribs of lower glume scabrid :—

Panicles compact, ovoid or oblong, rarely somewhat effuse, 1·6–8 in. long, branches ·3–1·5 in. long, spikelets crowded. Culms 1–12 in. high; leaves 1·5–7 in. long, ·12–·42 in. wide; lower glumes ·07–·13 in. long; upper lemma ·04–·06 in. long, scaberulous, awns ·13–·15 in. long........5. *holcoides.*

Panicles open, branches slender, spikelets not crowded :—

Culms very slender, 3–15 in. high; leaves aggregated near the base, distant above, with a naked peduncle to the panicle; leaves ·5–1·3 in. long, ·03–·1 in. wide; rhachis, the 3–6 branches up to 1 in. long and the pedicels capillary; glumes more or less setose, lower ·06–·08 in. long, upper ·1–·12 in. long; upper lemmas ·04 in. long, puberulous; awns very slender, ·1–·12 in. long............6. *pygmaea.*

Culms more robust; leaves mostly more than 2 in. long and ·07 or more in. wide :—

Glumes glabrous, lower ·06–·1 in. long, upper ·1–·13 in. long. Culms 3–20 in. high; leaves 1–12 in. long, ·12–·45 in. wide; panicles 2–20 in. long; upper lemmas ·04–·06 in. long, papillose, awns ·1–·11 in. long 7. *Metzii.*

Glumes usually more or less setose, lower ·08–·11 in. long, upper ·13–·15 in. long. Culms 1–4 ft. high; leaves 2·5–13 in. long, ·07–·2 in. wide; panicles decompound, 7–20 in. long, branches slender, up to 6 in. long; upper lemmas ·05–·6 in. long, scaberulous; awns ·16–·2 in. long........................8. *Lawii.*

Spikelets larger; upper lemma ·07 in. or more long, scaberulous; perennials :—

Panicles narrow, 2–7 in. long, branches spiciform, ·5–1 in. long, rarely longer, distant or approximate, spikelets crowded, subsessile, rhachis and branches densely villous. Culms 12–28 in. high; leaves mostly radical, flat, channelled or involute, stiff; more or less densely villous, rarely glabrous; glumes villous, lower ·25 in. long, upper ·28 in. long; upper lemmas ·13 in. long; awns ·18 in. long.................... 9. *villosa.*

Panicles effuse, branches long, spikelets pedicelled. Leaves glabrous:—

Branches of panicles distant; spikelets in distant pairs:—

Roots not tuberous, not woolly; culms 15–36 in. high; leaves 6–18 in. long; ·32–·45 in. wide; panicles 5–16 in. long, branches numerous, slender, up to 6 in. long, sometimes again branched; spikelets numerous, sometimes imbricate; lower glumes ·12–·15 in. long, ribs scabrid; upper ·15–·18 in. long; upper lemma ·07–·1 in. long; awns ·11–·12 in. long.................... 10. *nepalensis.*

Roots tuberous, densely woolly; culms slender, 6–33 in. high; leaves 4–8 in. long, ·1–·2 in. wide; panicles spreading, 4–9 in. long, branches few, distant, very slender, undivided, up to 5 in. long, pedicels long, capillary, spikelets few, distant; lower glumes ·1–·13 in. long, glabrous or scabrid on the ribs, upper ·15–·17 in. long; upper lemmas ·07–·1 in. long; awns ·2–·23 in. long, capillary .... 11. *mutica.*

Branches of panicles close, spikelets crowded, rarely rather open with fewer and distant spikelets, 2·5–6 in. long. Culms 3–24 in. high; leaves 2·3–9·5 in. long, ·15–·6 in. wide; lower glumes ·12–·16 in. long, upper ·16–·21 in. long; upper lemmas ·07–·09 in. long; awns ·15–·18 in. long.. 12. *fuscata.*

Upper lemma unawned, devoid of setae, without hairs at the base; perennials:—

Rootstock hairy; culms comparatively slender, 1–4 ft. high; leaves 3·5–15 in. long, ·15–·6 in. wide; panicles 3–13 in. long, branches 1–2·5 in. long; lower glumes ·07–·09 in. long, upper ·1–·11 in. long; upper lemmas ·05–·06 in. long, papillose 13. *leptochloa.*

Rootstock glabrous; culms rather stout, 20–30 in. high; leaves rigid, 5–11·5 in. long, ·3–·6 in. wide; panicles 7–19 in. long, branches up to 6 in. long; lower glumes ·08–·12 in. long, upper ·11–·15 in. long; upper lemma ·07–·09 in. long, asperous........ 14. *Lawsoni.*

1. ARUNDINELLA AVENACEA, Munro; F. B. I. vii. 69.
   W. Ghâts; 2,000–7,500 ft.

2. ARUNDINELLA MESOPHYLLA, Nees; F. B. I. vii. 69.
   W. Ghâts; 1,000–7,500 ft.

3. ARUNDINELLA SETOSA, Trin.; F. B. I. vii. 70. *A. nervosa*, Nees; F. B. I. vii. 70.
   In all Districts; sea-level to 7,000 ft. Vern. *Tel.* Pathi oopagaddi; *Kan.* Hakki varji hullu, Maraga thattu hullu.

Var. *lanifera*, C. E. C. Fischer n. var.

Roots woolly and the setae of the upper lemmas only ·02–·025 in. long.

Cuddapa District at Mogili kuppa (Gamble no. 21307), 3,000 ft.

4. ARUNDINELLA PUMILA, Steud. *A. tenella*, Nees; F. B. I. vii. 71.
   W. Coast and Ghâts; Mysore State (Meebold); sea-level to 6,000 ft.

5. ARUNDINELLA HOLCOIDES, Trin. *A. agrostoides*, Trin.; F. B. I. vii. 71.
   Godavari District at Bison Hill (Barber); Cuddapah Hills (Beddome); Mysore State (Meebold); W. Ghâts; 2,000–6,000 ft. Vern. *Mal.* Molam pullu.

6. ARUNDINELLA PYGMAEA, Hook. f.; F. B. I. vii. 72.
   S. Kanara at Pulicode.

7. ARUNDINELLA METZII, Hochst.; F. B. I. vii. 72.
   Mysore State; S. Kanara and N. Malabar Districts; sea-level to 3,000 ft.

8. ARUNDINELLA LAWII, Hook. f.
   Mysore at Sagar (Meebold); 2,000 ft.

9. ARUNDINELLA VILLOSA, Arn.; F. B. I. vii. 72.
   Bababudan, Pulney and Tinnevelly Hills; Attapadi Valley (Fischer); 2,000–7,000 ft.

10. ARUNDINELLA NEPALENSIS, Trin.; *A. brasiliensis*, Hook. f. non Raddi; F. B. I. vii. 73.
    Mysore, Pulney and Travancore Hills; 3,500–7,000 ft.

11. ARUNDINELLA MUTICA, Nees. *A. capillaris*, Hook. f.; F. B. I. vii. 74.
    Cuddapah and Nellore Districts; 300 to 3,000 ft.

12. ARUNDINELLA FUSCATA, Nees; F. B. I. vii. 74.
Mysore, Nilgiri, Anamallais and Pulney Hills; 3,000–7,000 ft. An excellent fodder.

13. ARUNDINELLA LEPTOCHLOA, Hook. f.; F. B. I. vii. 76.
W. Coast from N. Malabar District southwards; Tinnevelly Districts; at low elevations.

14. ARUNDINELLA LAWSONI, Hook. f.; F. B. I. vii. 76.
Nilgiri Hills; 3,000 to 6,000 ft. In swamps.

70. Avenastrum, Jessen

Erect, usually perennial herbs. *Leaves* usually expanded. *Panicles* effuse. *Spikelets* erect, all alike, 2–8-flowered, not jointed on the pedicels; rhachilla articulated at the base and between the lemmas. *Glumes* subequal or the upper longer, dorsally rounded or keeled; the lower 1–3-nerved; the upper 3–5-nerved. *Lemmas* all alike, lanceolate or ovate, usually deeply 2-cleft, sometimes 2-toothed or entire, bearing a geniculate awn with a twisted base from about the middle of the back; the lowest always long-awned, the upper ones with shorter awns or awnless; paleas narrow, 2-keeled, keels ciliate, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* long, glabrous or hairy above the middle, free within the lemma and palea or adhering to the latter.

AVENASTRUM ASPERUM, C. E. C. Fischer n. comb. *Avena aspera*, Munro; F. B. I. vii. 277.
Nilgiri and Pulney Hills; 6,000–7,500 ft.
Culms up to 4 ft. high; leaves 1–18 in. long, ·1–·22 in. wide, glabrous or more or less pilose; panicles 3–12 in. long; glumes ·26–·42 in. long, the lower 3-nerved; lowest lemma ·37–·42 in. long, cleft to the middle; awns ·5–·6 in. long.

Var. *Schmidii*, C. E. C. Fischer n. comb. *Avena aspera*, Munro var. *Schmidii*, Hook. f.; F. B. I. vii. 277.

Smaller and more slender; leaves mostly radical and more hairy; panicles smaller and more contracted with shorter branches; glumes ·17–·27 in. long, lower 1-nerved; lowest lemma, ·26–·3 in. long, entire; awns ·32 –·42 in. long.
Nilgiri and Pulney Hills; 7,000–8,000 ft.

Var. *polyneuron*, C. E. C. Fischer n. comb. *Avena polyneura*, Hook. f.; F. B. I. vii. 277.

Smaller than the typical species in culms and leaves; panicles very effuse with long spreading lower branches; glumes strongly nerved, ·32–·5 in. long, lower 3-nerved; lowest lemma ·44 in. long, cleft for about $\frac{2}{5}$ its length, awns ·7 in. long.

Doddabetta in the Nilgiri Hills (Gamble); 8,000 ft.

71. Avena, Linn.

Annual erect herbs. *Leaves* usually expanded. *Panicles* effuse, contracted or spiciform. *Spikelets* all alike, 2–4-flowered, not jointed on the pedicels; rhachilla articulated at the base and sometimes between the lemmas. *Glumes* subequal or unequal, the lower usually the shorter, dorsally rounded or weakly keeled, broadly ovate or ovate-lanceolate, acute, 5–11-nerved. *Lemmas* all alike, ovate or lanceolate, 2-toothed or deeply 2-cleft, awned from the back below the cleft or awnless, sometimes only the lowest awned; awn geniculate with a twisted base; paleas narrow, 2-keeled, keels scabrid or ciliate, containing a bisexual floret. *Lodicules* usually 2. *Stamens* 3. *Styles* 2, free. *Grain* long, glabrous or hairy at the apex, free within the lemma and palea or adhering to the latter.

Species of this genus—the Oats—occur only as cultivated crops in the Nilgiri Hills and an occasional escape is met with. The following two species have been recorded:

Rhachilla and lemmas glabrous; upper lemmas usually awnless 1. *sativa*.

Rhachilla hairy; lemmas hairy on the back below the middle; all the lemmas awned .... 2. *sterilis*.

1. Avena sativa, Linn.; F. B. I. vii. 275.
2. Avena sterilis, Linn.

A more slender plant than the first.

72. Coelachne, R. Br.

Small, erect or trailing marshland herbs. *Leaves* short, flat, convolute or involute. *Inflorescence* of open, contracted or spiciform panicles or a single spiciform raceme. *Spikelets* all alike,

sessile or pedicelled, not articulated, 2-flowered, both florets perfect or one or both unisexual, if both unisexual the upper ♀. *Glumes* subequal, membranous, orbicular or elongate. *Rhachilla* articulated above the persistent glumes, more or less elongate between the two lemmas, not produced above the upper. *Lemmas* dissimilar; the lower glabrous or nearly so, considerably longer than the upper, containing a bisexual or a ♂ floret; the upper coriaceous, more or less hairy, containing a bisexual or a ♀ floret; both paleate. *Lodicules* 2. *Stamens* 2–3. *Grain* fusiform or oblong, terete or plano-convex, free within the lemma and its palea.

Rhachis, pedicels and rhachilla terete. Nodes of culms pubescent; spikelets numerous; grain subterete, ·03–·04 in. long:—

Panicles interrupted, spiciform, ·4–3·5 in. long, branches appressed and congested or spreading and scattered, up to ·35 in. long, usually shorter, bearing up to 9 ovoid spikelets. Culms erect or decumbent, 2·5–15 in. high; leaves usually flat, ·4–·17 in. long, filiform to ·13 in. wide; glumes ·04–·06 in. long, suborbicular; lower lemmas ·06–·09 in. long, upper ·04–·06 in. long, puberulous 1. *pulchella* var. *simpliuscula.*

Panicles open, 1–2 in. long, branches spreading, distant, up to ·7 in. long, bearing 1–4 lanceolate spikelets. Culms erect, 4–6 in. high; leaves flat, ·5–1·1 in. long, up to ·06 in. wide; glumes ·05–·08 in. long, ovate-oblong; lower lemma ·1–·11 in. long, upper ·07–·09 in. long, puberulous................................2. *perpusilla.*

Rhachis, pedicels and rhachillas flat. Culms very slender, flaccid, trailing, up to 18 in. long, nodes glabrous, flowering culms 2–4 in. high, unbranched: spikelets in pairs, one sessile and one pedicelled; glumes ·11–·14 in. long, the lower ensiform, the upper oblong, concave; lower lemma ·16–·17 in. long, upper ·08–·09 in. long, broadly oblong, margins shaggily hairy; grain ·06 in. long, plano-convex 3. *Meeboldii.*

1. Coelachne pulchella, R. Br.; F. B. I. vii. 271.

Var. *simpliuscula*, Hook. f.

Mysore, Nilgiri, Pulney and Travancore Hills; 2,000–6,000 ft. Vern. *Kan.* Sanna purlai hullu.

2. Coelachne perpusilla, Thw. *C. pulchella*, R. Br. var. *gracillima*, Hook. f.; F. B. I. vii. 271.

Nilgiri Hills (Schmid).

3. Coelachne Meeboldii, C. E. C. Fischer in Kew Bull. 1934, 169.

Cochin State at Chalakudi (Meebold). In tanks.

73. Zenkeria, Trin.

Perennial herbs. *Leaves* narrow, flat, convolute or involute. *Panicles* effuse or contracted; branches capillary. *Spikelets* all alike, 2-flowered, laterally compressed, not articulate on the pedicels; rhachilla very short, bearded, disarticulating above the glumes, not or very shortly produced beyond the upper lemma. *Glumes* subequal or the upper longer, 1-nerved, keeled, persistent. *Lemmas* equal and similar, chartaceous, longer than the glumes, usually hairy below the middle, several-veined; paleas shorter, broad, 2-keeled, long-ciliate, enclosing a bisexual floret. *Lodicules* 2, ovate, denticulate. *Stamens* 3. *Styles* 2, free. *Grain* narrowly oblong.

Culms 11–28 in. high; leaves flat or convolute, 2·5–28 in. long, ·15–·3 in. wide, narrowed into a long stiff channelled quasi petiole; panicles 3–10 in. long, usually effuse; glumes ·07–·1 in. long; lemmas acuminate or caudate-acuminate, ·14–·2 in. long.......... 1. *elegans*.
Culms 6–10 in. high; leaves rigid, erect, flat with involute margins, 4–12 in. long, ·25–·3 in. wide, not narrowed into a quasi petiole; panicles 2·5–5 in. long, contracted; glumes ·1–·13 in. long; lemmas acute, ·16–·17 in. long................................ 2. *Stapfii*.

1. Zenkeria elegans, Trin.; F. B. I. vii. 270.
   N. Arcot, Salem, Coimbatore and Tinnevelly Districts Nilgiri and Pulney Hills; 1,500–7,000 ft.
2. Zenkeria Stapfii, Henr.
   Nilgiri Hills (Perrottet).

74. Arundo, Linn.

Tall, stout, perennial shrubs, often woody below. *Leaves* broad, flat. *Panicles* large, decompound; branches fascicled. *Spikelets* laterally compressed, not jointed on the pedicels, 2–8-flowered; rhachilla articulated at the base and between the lemmas. *Glumes* 2, persistent, subequal, narrow, acute or acuminate, keeled, 3-nerved. *Lemmas* lanceolate, entire and acuminate or 2-fid with an arista from the sinus, 3-nerved, long-silky-hairy on the back below the middle; paleas hyaline, 2-nerved, each containing a bisexual floret. *Lodicules* 2, obovate. *Stamens* 3. *Styles* 2, free. *Grain* oblong.

Arundo Donax, Linn.; F. B. I. vii. 302.
In most Districts except the W. Coast, usually near water; up to 2,000 ft.

Rhizome creeping; culms fistular, reed-like, up to 10 ft. high; leaves ensiform, amplexicaul, 8–24 in. long, ·5–2 in. wide; panicles 9–24 in. long; glumes ·25–·45 in. long; lemmas 2–4, the uppermost empty when more than 3, lowest ·42–·46 in. long, silky pilose.

Not a good fodder though cattle will eat the young leaves. The stems are used in thatch-roofing.

75. Neyraudia, Hook. f.

Tall, perennial, leafy herbs or shrubs. *Leaves* flat or sometimes convolute. *Panicles* effuse, decompound, often nodding. *Spikelets* laterally compressed, 4–8-flowered; rhachilla shortly bearded, jointed at the base or above the first lemma, in which case the latter is entire and empty, and between the lemmas. *Glumes* 2, membranous, subequal or the upper slightly the longer, keeled, 1-nerved. *Lemmas* elongate-subulate, often recurved, acuminate, entire or shortly 2-fid, with 2 setae and an often recurved arista from the tip or the sinus, strongly 3-nerved, sides long silky-hairy; paleas short, oblong, 2-keeled, keels scaberulous, all containing a bisexual floret or the lowest empty and glabrous. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* linear-subulate, base acute, loose in the lemma.

NEYRAUDIA ARUNDINACEA, Henr. *N. madagascariensis*, Hook. f.; F. B. I. vii. 305.

Travancore at Devicolam (Meebold); 6,000 ft.

Culms solid, sometimes woody below, 2–8 ft. or more high; leaves 8–24 in. long, ·2–1 in. wide; panicles up to 3 ft. high; glumes ·08–·13 in. long; lemmas ·14–·2 in. long.

76. Phragmites, Adans.

Tall, stout, perennial shrubs; rhizomes creeping, often very long; culms hollow, woody below, leafy nearly to the apex. *Leaves* flat. *Panicles* lax, usually large, decompound. *Spikelets* 3–10-flowered, linear, terete, slightly laterally compressed, not jointed on the pedicels; rhachilla long silky hairy above the lowest lemma, jointed between the lemmas, sometimes shortly prolonged beyond the uppermost. *Glumes* 2, persistent, membranous, unequal, oblong-lanceolate, 3-nerved. *Lemmas* much longer, the lowest linear-lanceolate, empty or containing a ♂ floret, the rest hyaline,

narrowly subulate-lanceolate, caudate-acuminate, 3-nerved; callus long, densely long-silky-hairy; paleas much shorter, 2-keeled, each containing a bisexual floret, the uppermost sometimes imperfect. *Lodicules* 2. *Stamens* 1–3. *Styles* 2, free. *Grain* oblong, terete.

PHRAGMITES KARKA, Trin., F. B. I. vii. 304.

In all Districts except the W. Coast; usually near water and often gregarious in large colonies; up to 3,000 ft.

Culms robust, sometimes up to 20 ft. high; leaves stiff, semi-erect, up to 25 in. long, ·3–1·5 in. wide; panicles up to 25 in. long; lower glumes ·12–·16 in. long, upper ·22–·24 in. long; lemmas ·36–·5 in. long.

The stems are made into pipes; split stems are plaited into mats. The culms and leaves are used for thatching.

77. Polypogon, Desf.

Slender, annual or perennial herbs. *Leaves* flat. *Panicles* spiciform or lobed, dense; rhachis fragile. *Spikelets* minute, uniform, crowded, laterally compressed, 1-flowered, articulate on the pedicels but persistent. *Glumes* 2, subequal, concave, keeled, entire or notched, with a slender arista from the sinus or from the back. *Lemma* much shorter, hyaline, broadly oblong, truncate, toothed, muticous or aristate; palea small, 2-nerved, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 1–3. *Styles* 2, free. *Grain* obovoid, free within the lemma and palea.

POLYPOGON MONSPELIENSIS, Desf.; F. B. I. vii. 245.

Bababudan Hills (Talbot).

Culms tufted, up to 2 ft. high; leaves 1–4 in. long, ·1–·15 in. wide; panicles cylindric or oblong, ·5–2 in. long; glumes ·06–·08 in. long, scaberulous, aristas 2–3 times as long; lemmas ·04–·05 in. long.

78. Aristida, Linn.

Annual or perennial, usually slender, tufted herbs. *Leaves* flat or more often convolute, very narrow. *Panicles* branched, contracted or effuse. *Spikelets* all alike, 1-flowered, slender, not articulated on the short or long pedicels; rhachilla very short, disarticulating above the upper glume. *Glumes* narrow, keeled, 3-nerved, the lower usually considerably the shorter, but sometimes subequal

or even longer, frequently aristate, sometimes 2-toothed. *Lemma* with a more or less bearded, usually pungent callus, narrow, involute, more or less cylindric, often attenuate at the apex, terminated by an awn usually consisting of 3 slender, hispidulous, usually subequal setae sessile on the lemma or supported by a short or long, usually twisted column, sometimes the 2 lateral setae shorter than the median or entirely suppressed, the median sometimes plumose, the lemma sometimes jointed at the middle or near the apex or just above the apex of the stamens; palea very narrow, short, embraced by the lemma, sometimes absent, the contained floret bisexual. *Lodicules* 2–3. *Stamens* 3. *Styles* 2, free. *Grain* narrowly cylindric or elongate-ellipsoid; embryo short or long.

Awn sessile; setae always 3, subequal:—

Glumes muticous. Culms slender, up to 2 ft. high; leaves 1·5–10 in. long; lower glume ·14–·23 in. long, upper ·24–·36 in. long; callus ·02–·03 in. long; lemma ·23–·44 in. long, keeled; setae ·44–·84 in. long . . . . 1. *depressa.*

Glumes, at least one, aristate; callus ·05–·08 in. long; glumes ·4–·7 in. long (including the aristas):—

Panicles contracted, 3–15 in. long; branches erect, straight, main axis terete, axils glabrous. Culms erect, 4–48 in. high; leaves up to 20 in. long; lemma ·38–·5 in. long; setae slender, 1–1·5 in. long . . . . 2. *setacea.*

Panicles effuse, 3–9 in. long, branches spreading, flexuous, main axis angled, axils hairy or prominently tumid. Culms usually straggling and curved, up to 2 ft. high; leaves up to 10 in. long; lemma ·32–·35 in. long; setae rigid, rather wide at the base, 1–1·8 in. long . . . . 3. *Hystrix.*

Awn supported by a column:—

Setae always 3, subequal:—

Lemma ·17–·23 in. long, elongate-fusiform, attenuate upwards, continuous with the ·1–·12 in. long column. Culms up to 14 in. high; leaves 1·5–3 in. long, glabrous; panicles usually contracted, 2–4·5 in. long; glumes shortly aristate, ·2–·32 in. long; callus ·02–·03 in. long; setae ·55–·8 in. long . . . . 4. *mutabilis.*

Lemma ·08–·17 in. long, cylindric, truncate, articulated with the ·6–1·4 in. long, scabrid column. Culms up to 2 ft. high; leaves 2·5–5 in. long, flat or convolute, glabrous or puberulous above, thinly pilose near the base; panicles narrow, lax, 1·5–7 in. long; glumes aristate, ·7–·9 in. long; callus ·08 in. long; setae 1·8–2·4 in. long . . . . 5. *funiculata.*

Setae often reduced to 1, ·8–1·2 in. long, the lateral when present much finer, ·3–·4 in. long. Culms tufted, 6–24 in. high; leaves 4–12 in. long; panicle lax, often expanded, 3–12 in. long; glumes shortly aristate, ·4–·6 in. long, the upper often suppressed; callus ·02–·04 in. long; lemma ·35–·6 in. long, continuous and not perfectly articulated with the ·38–·5 in. long column......6. *redacta.*

1. Aristida depressa, Retz. *A. adscencionis*, Linn.; F. B. I. vii. 224 *in part*; S. I. G. figs. 171, 172.
   In all but the wettest localities; up to 3,000 ft. Vern. *Tel.* Nari balana gaddi; *Tam.* Kodai balla pullu, Oosi pullu, Shigam pullu, Todapa puvada pullu; *Kan.* Kari sanna hanchi hullu.
2. Aristida setacea, Retz.; F. B. I. vii. 225; S. I. G. fig. 173.
   In all Districts; up to 3,000 ft.
   Used for making brooms. Rejected by cattle. Vern. *Kan.* Dodda hanchi hullu, Nai anchi katti.
3. Aristida Hystrix, Linn. f.; F. B. I. vii. 225; S. I. G. fig. 174.
   In all Districts; up to 3,000 ft.
   Said to be liked by cattle. Vern. *Kan.* Bili vunugada hullu.
4. Aristida mutabilis, Trin. et Rupr.; F. B. I. vii. 226; S. I. G. figs. 175, 176.
   Cuddapah, Nellore, Anantapur, Coimbatore and Tinnevelly Districts; up to 1,400 ft.
5. Aristida funiculata, Trin. et Rupr.; F. B. I. vii. 226; S. I. G. fig. 177.
   In all the Eastern Districts south of the Kistna River; up to 2,000 ft. Vern. *Tel.* Kundeti gaddi.
6. Aristida redacta, Stapf.; F. B. I. vii. 227.
   Bababudan Hills; Mysore State; Bellary and Kurnool Districts.

79. Agrostis, Linn.

Erect, usually perennial herbs. *Leaves* narrow, flat or slightly convolute. *Panicles* contracted or effuse, branches capillary, whorled. *Spikelets* all alike, 1-flowered, not jointed on the pedicels; rhachilla disarticulating above the glumes, not produced beyond the lemma. *Glumes* 2, equal or unequal, lanceolate, acuminate, keeled, muticous, 1-, rarely 3-nerved. *Lemma* shorter, hyaline, truncate, crenate or cleft, often awned on the back; callus short,

glabrous or bearded with hairs less than half as long as the lemma: palea usually much shorter, often minute or 0; the contained floret bisexual. *Lodicules* 2. *Stamens* 3. *Grain* free within the lemma.

Lemmas glabrous; callus glabrous or very shortly hairy:—

Glumes ·08–1 in. long, keel scaberulous; lemma ·06–·08 in. long, 3-toothed or -lobulate, awnless, palea 0–·05 in. long. Culms up to 3 ft. high; leaves 1·2–5·5 in. long, ·08–·13 in. wide; panicles 3–12 in. long, effuse (contracted in var. *prorepens*)......1. *stolonifera.*

Glumes ·11–·14 in. long; keels spinulose-ciliolate, at least in upper half; lemma ·06–·1 in. long, rounded or truncate and minutely 2-toothed, bearing a geniculate awn ·14–·16 in. long on the back close to the base, palea ·06–·1 in. long. Culms 10–18 in. high; leaves 1·2–7 in. long, ·05–·17 in. wide; panicles effuse, 5–12 in. long 2. *peninsularis.*

Lemmas hairy; callus long hairy; palea 0; keels of glumes usually spinulose-ciliolate:—

Rootstock slender; culms 4–26 in. high; leaves 1–8 in. long, ·03–·1 in. wide, base not narrowed; panicles effuse, 2·5–7 in. long; glumes ·09–·13 in. long; lemma ·07–·09 in. long, truncate, lobulate or minutely denticulate, awn ·09–·16 in. long..........3. *pilosula.*

Rootstock stout, covered with the old sheaths; culms 8 in. high; cauline leaves few, 1–1·5 in. long, very slender, base not narrowed, radical leaves up to 4 in. long and ·15 in. wide, narrowed into a rigid quasi petiole; panicles 1·5 in. long; glumes ·13 in. long; lemma ·09 in. long, truncate, 2–4-dentate, awn ·18 in. long 4. *Schmidii.*

1. AGROSTIS STOLONIFERA, Linn. *A. alba*, Linn.; F. B. I. vii. 254.

Nilgiri and Pulney Hills; 6,000–7,000 ft.

Var. *prorepens*, Koch.

Rather smaller in all its parts; bearing stolons up to 1 ft. long; panicles contracted.

Nilgiri Hills; 7,000 ft.

2. AGROSTIS PENINSULARIS, Hook. f.; F. B. I. vii. 255.

Nilgiri and Pulney Hills; 6,000–7,000 ft.

3. AGROSTIS PILOSULA, Trin. *Calamagrostis pilosula*, Hook. f.; F. B. I. vii. 263.

Nilgiri and Pulney Hills; 3,000–8,000 ft.

4. AGROSTIS SCHMIDII, C. E. C. Fischer n. comb. *Calamagrostis Schmidii*, Hook. f.; F. B. I. vii. 264.

Nilgiri Hills (Schmid).

80. Garnotia, Brogn.

Erect, perennial, rarely annual herbs. *Leaves* flat or convolute. *Panicles* terminal, branches slender. *Spikelets* solitary or twin, articulated on the pedicels, very small, narrowly lanceolate, terete, 1-flowered; rhachilla not produced beyond the lemma. *Glumes* 2, subequal, lanceolate, acute, acuminate, cuspidate or awned. *Lemma* narrowly lanceolate, entire or notched, awned, sometimes 3-awned, rarely muticous; awns straight or with a twisted base, sometimes geniculate or recurved, palea narrower, often auricled at the base; containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* linear or oblong, free within the lemma and palea; embryo about $\frac{2}{3}$ as long.

Culms tufted, nodes glabrous; leaves mostly basal, not articulated on the sheaths, margins of sheaths often woolly :—

Leaves complicate, glabrous, basal sheaths flattened, equitant; panicles contracted, usually very narrow, lemmas geniculately awned :—

Leaves flexuous, not stiff, 9–18 in. long, ·1 in. wide, margins smooth. Culms slender, 6–20 in. high; panicles 2·5–10 in. long; glumes ·19–·22 in. long, with cusps ·03–·05 in. long; lemma ·16 in. long, awn ·4 in. long........................1. *Schmidii.*

Leaves straight, rigid, often trigonous in section, 15–26 in. long, ·1–·15 in. wide, margins scabrid. Culms stout up to 3 ft. high; panicles 8–36 in. long; glumes ·16–·22 in. long, lower cuspidate, upper muticous; lemma ·1–·15 in. long, awn ·22–·28 in. long 2. *scoparia.*

Leaves flat, pubescent below, narrowed into a long, silky quasi petiole, up to 34 in. long, ·3–·6 in. wide, sheaths not flattened or equitant, bristly. Culms stout, up to 3 ft. high; panicles up to 20 in. long, effuse; glumes muticous or very shortly cuspidate, ·16–·2 in. long; lemmas ·13–·16 in. long, awnless......3. *tectorum.*

Culms not tufted, nodes usually more or less hairy; leaves scattered, flat, articulate on the sheaths :—

Panicles contracted; branches suberect :—

Leaves narrowed to the base, 1–8 in. long, ·1–·4 in. wide, glabrous or pubescent. Culms often geniculate and rooting below, up to 3 ft. high; panicles 2·5–9 in. high; glumes ·08–·15 in. long, lower usually muticous, upper usually cuspidate; lemma ·07–·13 in. long, awn ·26–·35 in. long..........................4. *stricta.*

Leaves broad at the base, rounded or subcordate, 3–10 in. long, ·36–1 in. wide, often short-hairy below. Culms up to 3 ft. high; panicles 5–12 in. long; glumes ·1–·12 in. long, both aristulate; lemma ·09–·12 in. long, awn ·2–·46 in. long......5. *arundinacea.*

Panicles lax, 2·5–5·5 in. long; branches in distant fascicles, at length spreading. Culms slender, 3–20 in. high; leaves 1·5–3·5 in. long, ·1–·3 in. wide, narrowed to the base, pubescent; glumes ·1–·14 in. long, muticous, sometimes apiculate; lemma ·09–·11 in. long, awn ·14–·43 in. long........................6. *courtallensis.*

1. Garnotia Schmidii, Hook. f.; F. B. I. vii. 242.
   Nilgiri Hills (Schmid, Lawson); 4,500 ft.
2. Garnotia scoparia, Stapf ex Hook. f.; F. B. I. vii. 242.
   G. tenuiglumis, Stapf. ex Hook. f.; F. B. I. vii. 242.
   In most localities except the wettest; up to 7,000 ft.
3. Garnotia tectorum, Hook. f.; F. B. I. vii. 242.
   Anamallai Hills (Beddome); Travancore State at Devicolam (Meebold); 6,000 ft.
4. Garnotia stricta, Brogn.; F. B. I. vii. 243.
   Mysore State, W. Coast and Ghâts; sea-level to 4,000 ft. Sometimes epiphytic.
5. Garnotia arundinacea, Hook. f.; F. B. I. vii. 243.
   W. Ghâts; up to 6,000 ft. Vern. *Kan.* Dobrai hullu.
6. Garnotia courtallensis, Thw.; F. B. I. vii. 244.
   Nilgiri, Pulney and Travancore Hills; 6,000–7,000 ft.

81. Trachys, Pers.

Annual, diffuse or erect herbs. *Leaves* flat. *Inflorescence* of a solitary spiciform raceme or more usually 2–3 radiating from the apex of a long peduncle; rhachis rigid, flat, broad, jointed, bearing on the underside of each joint shortly peduncled clusters of 1–6 sessile spikelets mixed with small, scale-like, rigid, flowerless glumes. *Spikelets* subglobose. *Glumes* dissimilar; the lower small, coriaceous; the upper elongate, membranous, 3–5-nerved. *Lemmas* dissimilar; the lower broadly ovate to ovate-oblong, rigidly coriaceous, 9- or more-nerved, its palea minute, empty; the upper smaller, chartaceous, ovate-lanceolate to linear-oblong, its palea as long, containing a bisexual floret. *Lodicules* 2, very minute or 0. *Stamens* 3. *Styles* 2, free. *Grain* oblong, compressed, free within the lemma and palea.

TRACHYS MURICATA, Steud. *T. mucronata*, Pers.; F. B. I. vii. 96; S. I. G. fig. 121. *Panicum squarrosum*, Retz.; Roxb. Cor. Pl. t. 206.

In all but the wettest localities, often in sea-shore sand.

Culms diffuse and rooting below or erect and up to 2 ft. high; leaves 1–6·5 in. long, ·1–·5 in. wide, more or less softly-villous; racemes ·5–2·5 in. long, rhachis ·12–·17 in. wide, its midrib stout; lower glume ·07–·11 in. long, upper ·13–·14 in. long; lower lemma ·21–·24 in. long, 9–13-nerved, upper ·15–·16 in. long.

82. Tragus, Haller

Annual or perennial, small, rigid, decumbent or erect herbs. *Leaves* short, flat. *Raceme* spiciform, solitary, terminal. *Spikelets* sessile in deciduous clusters usually of 2 facing each other, seldom 3 and very rarely 4 or 5, not or obscurely articulated on a short peduncle, 1-flowered. *Glumes* 2 or the lower suppressed; the lower when present minute, hyaline; the upper narrowly lanceolate, concave, acuminate, 5-ribbed, ribs armed with hooked spinules. *Lemma* solitary, thinly chartaceous, lanceolate, its palea as long, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* linear-oblong, free within the lemma and palea.

TRAGUS BIFLORUS, Schult. *T. racemosus*, Hook. f. non All.; F. B. I. vii. 97; S. I. G. figs. 122, 123.

In all but the wettest tracts; often in sandy localities; sea-level to 3,000 ft.

Culms 2–8 in. high; leaves rigid, glaucous, glabrous, margins stiffly ciliate, ·4–2 in. long, ·1–·15 in. wide; racemes ·7–2·8 in. long; upper glume ·16–·18 in. long, sometimes purple, white and semi-transparent between the ribs, lemma ·1–·11 in. long, puberulous.

83. Lopholepis, Dcne.

Tufted, erect herbs. *Leaves* small, flat. *Racemes* spiciform, simple, terminal. *Spikelets* minute, 1-flowered, shaped somewhat like the head of a bird, jointed but persistent on the short pedicels. *Glumes* coriaceous; the lower incumbent on the upper, consisting of a globose base and a cymbiform limb, keel with a narrow cartilaginous wing, pectinately ciliate with spinules hooked at the tip; the upper lanceolate, acute, similarly keeled. *Lemma* hyaline,

minute, broadly oblong, its palea broad, hyaline, containing a bisexual floret. *Lodicules* 0. *Stamens* 3. *Styles* 2, free. *Grain* subulate, concave in front, base gibbously incurved, free within the rigid glumes.

LOPHOLEPIS ORNITHOCEPHALA, Steud.; F. B. I. vii. 98.

Nilgiri (F. Foulkes) and Madura Hills; Madura and Tinnevelly Districts and Travancore near the coast.

Glabrous except the inflorescence; culms slender, 3–14 in. high; leaves imbricate at the base, distant upwards, ·4–1·8 in. long, ·05–·25 in. wide, margins scabrid; racemes 2–6 in. long; pedicels puberulous and with a fringe of stiff hairs on opposite sides; spikelets ·07–·09 in. long; glumes muricate, reddish-brown at maturity, lower as long as the spikelets, upper shorter; lemma ·03–·04 in. long, curved.

84. Perotis, Aiton

Tufted, wiry herbs, usually geniculate at the base. *Leaves* flat. *Racemes* spiciform, simple, terminal. *Spikelets* minute, subulate, 1-flowered, articulated on short or rudimentary pedicels, falling entire. *Glumes* subequal, narrow, tapering into a long, capillary awn. *Lemma* hyaline, much shorter than the glumes, its palea narrower, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, shortly connate. *Grain* linear, terete, nearly as long as the glumes and free within them; embryo $\frac{1}{3}$ as long.

PEROTIS INDICA, O. Ktz. *P. latifolia*, Ait.; F. B. I. vii. 98; S. I. G. figs. 124, 125.

Common in all Districts; on sea-shore sands and elsewhere up to 5,000 ft.; usually in dry soils. Vern. *Tel.* Nakka peechu, Nakka toka; *Tam.* Narival, Kudrai-val pillu, Thopparai pillu; *Kan.* Nari misai hullu, Jabburu korlai hullu.

Culms 2–18 in. high; leaves closely imbricate below, rigid, pungently acute, ·3–2·2 in. long, ·15–·4 in. wide, margins spinulose-ciliate; racemes slender, 1·2–7·5 in. long, feathery owing to the long awns; spikelets ·06–·08 in. long; glumes hispid; awns ·3–·65 in. long, usually purplish.

85. Zoysia, Willd.

Small, rigid herbs. *Leaves* very narrow, convolute, rigid. *Racemes* spiciform, solitary, simple, terminal; rhachis inarticulate, notched,

Spikelets ovoid, laterally compressed, 1-flowered, articulated on very short, rather stout pedicels appressed to the rhachis. *Glume* single, coriaceous. *Lemma* smaller than and completely enclosed in the glume, hyaline; palea linear-oblong, containing a bisexual floret. *Lodicules* 0. *Stamens* 3. *Styles* 2, very long, connate below. *Grain* oblong, free within the lemma and glume.

ZOYSIA MATRELLA, Merr. *Z. pungens*, Willd.; F. B. I. vii. 99.

In sea-shore sand on both coasts.

Rootstock wiry, creeping, up to 3 ft. long; culms 1–10 in. high; leaves many, ·5–2 in. long; racemes ·3–1·4 in. long; glumes ·1–·14 in. long.

86. **Sporobolus**, R. Brown

Perennial, rarely annual, erect, prostrate or creeping herbs. *Leaves* narrow, flat or convolute. *Panicles* effuse or spiciform, often pyramidal. *Spikelets* small or minute, all alike, 1-, rarely 2-flowered, jointed on the pedicels or rarely on the rhachis; rhachilla very short, jointed at the base, not produced beyond the upper or the only lemma. *Glumes* membranous, muticous, nerveless or 1–3-nerved, unequal, the lower smaller, sometimes minute, persistent or falling singly. *Lemmas* muticous, ovate or oblong; paleas as long, sometimes emarginate, closely 2-nerved and often splitting between the nerves as the grain matures, enclosing a bisexual floret. *Lodicules* 2, very minute or 0. *Stamens* 2–3. *Styles* 2, free. *Grain* oblong, obovoid or pyriform, free within the lemma and palea; pericarp thin, hyaline, loose; embryo large.

Lower glume distinctly shorter than the lemma:—
- Upper glume distinctly shorter than the lemma; leaves glabrous, flat, complicate or convolute mixed:—
  - Panicles effuse:—
    - Lemma ·06 in. or more long:—
      - Lemma ·06 in. long. Culms up to 30 in. high; leaves 4–12 in. long, ·05–·15 in. wide; panicles 4–18 in. long; lower glumes ·01–·02 in. long, upper ·02–·04 in. long . . 1. *diander.*
      - Lemma ·07–·08 in. long. Culms up to 3 ft. high; leaves 3–24 in. long, ·15–·23 in. wide; panicles 6–18 in. long; lower glumes ·02–·03 in. long, upper ·04–·06 in. long . . 2. *Wallichii.*
    - Lemma ·04 in. or less long. Culms up to 15 in. high; leaves 5–11 in. long, ·1–·2 in. wide; panicles 12–20 in. long; lower glumes ·01 in. or less long, upper ·02 in. long . . 3. *minutiflorus.*

Panicles spiciform or narrow, rarely slightly expanded :—
Leaves flaccid, usually flat, not pungent, up to 16 in. long, ·1–·22 in. wide. Not stoloniferous; culms up to 3 ft. high; rather robust; panicles 4–14 in. long, sometimes slightly expanded; lower glumes ·02–·03 in. long, upper ·04–·05 in. long; lemma ·06–·08 in. long .... 4. *indicus.*
Leaves rigid, usually convolute, pungent. Stoloniferous :—
Panicles subspiciform, sometimes interrupted and flexuous, ·3–4·5 in. long. Culms 7–17 in. high; leaves ·33–2·5 in. long, ·07–·14 in. wide; spikelets shortly pedicelled; lower glume ·04–·05 in. long, lanceolate, acute, upper ·06–·08 in. long; lemma ·06–·1 in. long .... 5. *tremulus.*
Panicles strictly spiciform, ·7–2·5 in. long. Culms 3–9 in. high; leaves ·7–2·7 in. long; spikelets sessile, crowded; lower glumes ·02–·03 in. long, quadrate, truncate, upper ·05–·06 in. long; lemma ·07 in. long.......... 6. *spicatus.*
Upper glume as long as or longer than the lemma :—
Stoloniferous; leaves glabrous, margins minutely serrulate, convolute, rigid, pungent, ·7–6 in. long. Culms 2·5–14 in. high; panicles spiciform or narrowly pyramidal, 1–4 in. long; lower glumes ·03–·04 in. long, upper ·06–·1 in. long; lemma ·06–·08 in. long .... 7. *orientalis.*
Not stoloniferous; leaves pilose or bristly, rarely nearly glabrous.
Panicles contracted, subspiciform, 1–3 in. long. Culms tufted, 1–12 in. high; leaves flat or convolute, sparsely softly pilose, margins serrulate, sometimes ciliate from minute tubercles, ·6–5·5 in. long, ·05–·1 in. wide; lower glumes ·04–·06 in. long, upper ·06–·08 in. long; lemma ·07 in. long....... 8. *piliferus.*
Panicles effuse; leaves flat, base rounded or subcordate, margins cartilaginous, serrulate and ciliate from tubercles :—
Panicles 1·5–5·2 in. long; rhachis and branches smooth. Culms tufted, spreading, 2–20 in. high; leaves glabrous or sparsely hairy from minute tubercles, ·4–6·5 in. long, ·15–·22 in. wide; glumes glabrous, lower ·01–·02 in. long, upper ·05–·07 in. long; lemma ·05–·06 in. long.. 9. *coromandelianus.*
Panicles 3–8 in. long, rhachis and branches scaberulous. Culms tufted, 4–20 in. high; leaves bristly from tubercles, 1·5–5 in. long, ·18–·45 in. wide; glumes more or less keeled, scaberulous on the back and keel, lower ·04–·05 in. long, upper ·06–·09 in. long; lemma ·05–·06 in. long
10. *scabrifolius.*

Lower glume as long as or longer than the lemma. Culms decumbent below, erect portion 7–10 in. high; leaves convolute, rarely flat, rigid, pungent, margins smooth, ·7–4 in. long, ·1 in. wide; panicles narrow, 1–3 in. long; glumes and lemma subequal ·08–·1 in. long

11. *virginicus.*

1. SPOROBOLUS DIANDER, Beauv.; F. B. I. vii. 247; S. I. G. fig. 178.

   In all Districts except the W. Coast; up to 3,500 ft.

   Readily eaten by cattle. Vern. *Kan.* Navalu dondi hullu, Thoddu karai kandaka hullu.

2. SPOROBOLUS WALLICHII, Munro ex Hook. f.; F. B. I. vii. 248.

   In the central and eastern Districts from Cuddapah southwards; up to 3,000 ft.

3. SPOROBOLUS MINUTIFLORUS, Link; F. B. I. vii. 248.

   S. Kanara and Chittoor Districts.

4. SPOROBOLUS INDICUS, R. Br.; F. B. I. vii. 247.

   Kistna, Nilgiri, N. Coimbatore, Madura and Tinnevelly Districts; sea-level to 7,000 ft.

   A good pasture grass. Hardly distinguishable from some forms of *S. diander*, Beauv.; both may have 2 or 3 stamens.

5. SPOROBOLUS TREMULUS, Kunth.; F. B. I. vii. 250; S. I. G. figs. 179, 180.

   In all Districts except the W. Coast and Ghâts; up to 2,500 ft. Vern. *Tam.* Uppurutnam pillu.

6. SPOROBOLUS SPICATUS, Kunth; F. B. I. vii. 250.

   Deccan, Coimbatore and Tinnevelly Districts; up to 1,000 ft.

7. SPOROBOLUS ORIENTALIS, Kunth; F. B. I. vii. 251.

   Godavari, Kistna, Guntur, Chingleput and Tinnevelly Districts; usually in saline soils.

8. SPOROBOLUS PILIFERUS, Kunth; F. B. I. vii. 251.

   W. Coast and Ghâts; up to 7,000 ft.

9. SPOROBOLUS COROMANDELIANUS, Kunth; F. B. I. vii. 252; S. I. G. figs. 181, 182. *S. commutatus*, Kunth; S. I. G. figs. 183, 184.

   In all central and eastern Districts; sea-level to 3,000 ft.

   A poor fodder. Vern. *Kan.* Nari balada hennu hullu.

10. SPOROBOLUS SCABRIFOLIUS, Bhide; S. I. G. figs. 185, 186.
Coimbatore and Tinnevelly (Wight) Districts; usually in black cotton soil.

11. SPOROBOLUS VIRGINICUS, Kunth; F. B. I. vii. 249.
Coastal sands; not very common.

87. Myriostachya, Hook. f.

Tall, stout, perennial marsh herbs; rootstock thick, spongy. *Leaves* narrow, long, flat, equitant. *Panicles* narrow, elongate; branches racemed, filiform; pedicels jointed on the branchlets. *Spikelets* very many, strongly laterally compressed, distichously racemed, 4–20-flowered, not jointed on the pedicels; rhachilla very stout, ultimately fragile at the base and between the slightly distant lemmas, not prolonged beyond the uppermost lemma. *Glumes* 2, coriaceous, persistent, subequal, lanceolate, tapering into a rigid awn, 1-nerved. *Lemmas* coriaceous, ovate-lanceolate, narrowed into a very short, stout, scabrid awn, 3-nerved, keel smooth; paleas as long, chartaceous, acuminate, 2-toothed, 2-keeled, keels ciliate, containing each a bisexual floret. *Lodicules* 2, very minute. *Stamens* 3; anthers very small. *Styles* 2, free. *Grain* obliquely ovoid, subterete; embryo large.

MYRIOSTACHYA WIGHTIANA, Hook. f.; F. B. I. vii. 327.
Godavari District at Coringa.
Culms densely tufted, up to 10 ft. high; rootstock sheathed, sometimes floating; leaves several feet long, up to ·65 in. wide; panicles 1–2 ft. long; spikelets 4–8-flowered; glumes ·17–·21 in. long.

88. Desmostachya, Stapf

Perennial herbs, branched at the base; branches covered with leathery sheaths at or just above the base. *Leaves* coarse, tufted. *Panicles* terminal, long, spiciform, often interrupted below; axis stiff; branches more or less spreading. *Spikelets* linear, strongly laterally compressed, often very many-flowered, sessile or subsessile, closely packed and more or less 2-ranked on the lower side of and often at right angles to the rhachis, straw-coloured or tinged with brown or purple, falling entire. *Glumes* 1-nerved, 1-keeled. *Lemmas* rigidly membranous, ovate, acute or subacute, muticous,

3-nerved, acutely 1-keeled; paleas slightly shorter, 2-keeled, each containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* obliquely ovoid, obtusely trigonous, loosely enclosed in the lemma and palea; embryo about $\frac{1}{3}$ as long.

DESMOSTACHYA BIPINNATA, Stapf. *Eragrostis cynosuroides*, Beauv.; F. B. I. vii. 324; S. I. G. fig. 226.

Vizagapatam, Kistna, Nellore, Chingleput and Bellary Districts; usually in sandy soil, often in wet places; at low elevations.

Culms stout or slender, 7–36 in. high; stolons stout, covered with shining sheaths; leaves rigid, tips setaceous, 2–18 in. long, ·05–·3 in. wide; panicles 2·5–13 in. long; glumes ·04–·06 in. long; lemmas ·06–·08 in. long.

89. Leptochloa, Beauv.

Annual, usually slender herbs. *Leaves* flat or involute. *Panicles* lax; branches slender, spiciform. *Spikelets* small, sessile or shortly pedicelled, 1–many-flowered, alternate and unilaterally 2-seriate, not jointed at the base; rhachilla jointed at the base, produced and jointed between the lemmas. *Glumes* membranous, oblong or lanceolate, 1-keeled, 1-nerved, the upper the longer. *Lemmas* ovate, obtuse or subacute, sometimes cuspidate, 1-keeled, 3-nerved, the lateral nerves close to the margins, often pubescent; paleas shorter, 2-keeled, each containing a bisexual floret or the terminal imperfect. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* subglobose, oblong-obovoid, compressed or trigonous, closely embraced by the lemma and palea, free or cohering to the latter.

Leaves lanceolate, flat, ·9–3·5 in. long, ·2–·6 in. wide. Culms up to 42 in. high; panicles up to 13 in. long; racemes usually distant, 1–5 in. long; spikelets 1-flowered; glumes linear-lanceolate, acuminate or caudate, ·09–·1 in. long; grain fusiform, obtusely trigonous, rarely slightly compressed, grooved on one side, ·05 in. long 1. *uniflora*.

Leaves narrowly linear, flat or involute:—

Spikelets 1-flowered. Culms 12–30 in. high; leaves 3–7 in. long, ·1–·12 in. wide; panicles 6–13 in. long; racemes close, ·6–2·3 in. long; glumes lanceolate, obtuse or apiculate, ·05–·06 in. long; grain ovoid, ·03–·04 in. long........................2. *polystachya*.

Spikelets 2–7-flowered :—

Glumes lanceolate, acute, acuminate or caudate, ·04–·06 in. long; lemmas pubescent or hairy :—

Culms slender, 3–12 in. high ; leaves flat, 1·5–5·4 in. long, ·1–·16 in. wide ; panicles 2–5 in. long ; racemes very slender, 1–2·5 in. long ; florets usually 2, sometimes 3 ; grain subglobose, one side gibbous, the other convex, ·025 in. long......3. *filiformis.*

Culms comparatively stout, 1–4 ft. high ; leaves flat or involute, 2·5–11 in. long, ·1–·25 in. wide ; panicles 6–14 in. long ; racemes 2–4·2 in. long ; florets usually 3–6, sometimes 2 or 7 ; grain ellipsoid to oblong, biconvex or compressed 4. *chinensis.*

Glumes ovate, rounded or retuse, ·06–·08 in. long. Culms up to 8 ft. high ; leaves flat, 7–17 in. long, ·1–·2 in. wide ; panicles 4–6 in. long ; racemes 2–3·5 in. long ; lemmas glabrous with the keel ciliolate ; grain oblong or obovate-oblong, rounded, concavo-convex, ·05 in. long ....5. *obtusiflora.*

1. Leptochloa uniflora, Hochst. ; F. B. I. vii. 297.
   Chingleput, S. Coimbatore, S. Malabar, Madura and Tinnevelly Districts ; Travancore ; sea-level to 4,000 ft.
2. Leptochloa polystachya, Benth. ; F. B. I. vii. 298.
   In the eastern Districts from Godavari to Tinnevelly ; sometimes in marshes ; up to 1,000 ft.
3. Leptochloa filiformis, Roem. et Sch. ; F. B. I. vii. 298.
   Vizagapatam, Godavari, Chingleput and Tanjore Districts.
4. Leptochloa chinensis, Nees ; F. B. I. vii. 299 ; S. I. G. fig. 212.
   In most Districts ; often in wet places ; sea-level to 3,000 ft. A moderate fodder. Vern. *Tel.* Cheepura gaddi ; *Kan.* Kadu sanna kari sajjai hullu.
   Some forms of this species are hardly distinguishable from the previous one.
5. Leptochloa obtusiflora, Hochst. ; F. B. I. vii. 299.
   Nilgiri and Coimbatore Districts ; Cochin State ; 1,000–2,000 ft.

90. Eragrostis, Beauv.

Annual or perennial, usually erect and slender herbs. *Leaves* narrow, flat, complicate or convolute. *Inflorescence* of terminal open or contracted panicles, rarely of simple spikes. *Spikelets*

small, many-, rarely 1–2-flowered, usually strongly laterally compressed, not articulated at the base; rhachilla continuous or articulate between the lemmas, not prolonged beyond the uppermost. *Glumes* 2, usually separately deciduous, broad, obtuse, acute or mucronate, never awned, back rounded, 1-keeled, 1-nerved or the upper sometimes 3-nerved. *Lemmas* imbricate, longer than the glumes which they resemble, sometimes acuminate or emarginate, 3-nerved, ultimately deciduous; paleas deciduous with their lemmas or persistent, broad, 2-keeled, keels smooth, scabrid or ciliate, each containing a bisexual floret or the uppermost and rarely the lowermost imperfect. *Lodicules* 2, very minute or 0. *Stamens* 1–3. *Styles* 2, free. *Grain* minute, globose, oblong-ovoid or obovoid, free within the lemma and palea.

Spikelets panicled :—
  Rhachilla more or less jointed, breaking up from the apex downwards :—
    Lemmas ciliate :— (1–21)
      Lemmas acuminate, mucronate or cuspidate :—
        Panicles clavate, dense, sometimes shortly interrupted at the base, rather shining, ·8–4 in. long; glumes ·06–·1 in. long, obtuse; lemmas ·1–·11 in. long; keels of paleas narrowly winged, long-ciliate. Culms 4–30 in. high; leaves 1·2–5·5 in. long, ·1–·25 in. wide, usually flat...... 1. *spicata.*
        Panicles cylindric, compact, ·8–3 in. long; glumes ·04–·06 in. long, acute; lemmas ·08 in. long; keels of paleas not winged, long-ciliate. Culms 8–36 in. high; leaves 2·5–9 in. long, ·1–·3 in. wide.............................. 2. *ciliata.*
      Lemmas obtuse, ·04–·08 in. long; keels of paleas short to long-ciliate. Culms wiry, 4–30 in. high; leaves 1–5 in. long, ·15 in. wide; panicles subspiciform, often lobed, dense or somewhat lax, 1·3–5 in. long .... 3. *coarctata.*
    Lemmas not ciliate :—
      Panicles spiciform :—
        Annuals; culms slender, 5–10 in. high; leaves flat or convolute, usually ascending, 2–3·5 in. long, ·1–·15 in. wide; panicles 1·5–2·5 in. long; lemmas ·06–·08 in. long, their lateral nerves very close to the margins; paleas ·05–·06 in. long, ciliae of keels soft, distinctly longer than the width of the expanded palea.......................... 4. *ciliaris.*
        Perennials; culms wiry, 5–20 in. high, leaves often at

right angles to the culm; panicles ·5–2·2 in. long; lemmas ·04–·065 in. long, their lateral nerves near the middle of the sides; paleas ·04–·05 in. long, ciliae of keels stiff, shorter than the width of the expanded palea..........5. *riparia.*

Panicles more or less effuse :—

Panicles thyrsiform, 10–24 in. long; branches numerous, capillary, scaberulous, pedicles longer than the spikelets. Culms 8–26 in. high; leaves 8–18 in. long, ·2–·4 in. wide; glumes ·04–·05 in. long, obtuse; lemmas ·06 in. long, obtuse or emarginate; grain subglobose, ·02 in. long....6. *aspera.*

Panicles oblong or linear, not thyrsiform :—

Grain ovoid, ·015–·02 in. long; stamens 3 :—

Culms 2–18 in. high, more or less viscid below the panicle; leaves ·7–4·5 in. long, ·1–·2 in. wide, usually convolute; panicles cylindric or oblong, 1–7 in. long; lower part of rhachis more or less viscid, branches and pedicels with minute glands, scented when fresh; glumes ·03–·05 in. long, obtuse; lemmas ·04–·05 in. long ....7. *viscosa.*

Culms 4–18 in. high, no part of plant viscid or glandular; leaves 3–7·5 in. long, ·1–·25 in. wide; panicles variable, linear, contracted to oblong and effuse, 1·5–9 in. long; glumes ·03–·05 in. long, obtuse or subacute; lemmas ·04–·06 in. long, obtuse or acute ....8. *plumosa.*

Grain obovoid, ·01 in. long; stamens 2; panicles narrow, more or less interrupted :—

Branches of panicles more or less *whorled*; spikelets 2–7-, sometimes up to 9-flowered. Culm 6–17 in. high; leaves flat or complicate, 4–10 in. long, ·12–2 in. wide; panicles 6–13 in. long; glumes ·016–·04 in. long; lemmas ·035–·05 in. long ....9. *japonica.*

Branches of panicles mostly solitary; spikelets 8–14-, seldom 6- or 7-flowered. Culms 12–24 in. high; leaves as in the previous species, up to 16 in. long, ·25 in. wide; panicles up to 24 in. long; glumes and lemmas as in the previous species ....10. *diarrhena.*

Rhachilla tough, persistent, lemmas falling off from the base upwards :—

Spikelets ovate or ovate-oblong, much compressed, ·16–·8 in. long, ·12–·18 in. wide, up to 80-flowered, pale or purple. Culms 5–25 in. high; leaves 1–7 in. long, ·1–·2 in wide; panicles oblong

or ovoid, ·8–10 in. long; branches usually spreading; glumes ·06–·1 in. long, acute; lemmas usually slightly shorter, broad, mucronate, their lateral nerves prominent; paleas not or very narrowly winged, falling with the lemmas; grain ellipsoid. or obovoid, ·025–·035 in. long.......................11. *unioloides.*

Spikelets linear or linear-oblong, slightly compressed, lateral nerves of lemmas weak, or if spikelets flattened and lateral nerves prominent, then the paleas persistent:—

Spikelets more or less fascicled, close, pointing forwards:—

Leaves glaucous, 1·3–12 in. long, ·13 in. wide. Culms 5–56 in. high, often stout; panicles narrow, 2–12 in. long; lemmas ·06–·1 in. long; grain oblong or oblong-fusiform, ·03–·04 in. long ....12. *gangetica.*

Leaves not glaucous, 2–5 in. long, ·05–·12 in. wide. Culms 3–36 in. high; panicles contracted or oval and more or less effuse, 3–10 in. long; lemmas ·05 in. long; grain globose or subglobose, ·016–·025 in. long.....................13. *nutans.*

Spikelets scattered, spreading or pendulous:—

Upper glume 3-nerved, ·08 in. long, lower shorter. Culms 10–40 in. high; leaves 7–14 in. long, ·18–·32 in. wide, flat, margins usually glandular; panicle oblong, usually open, 4–13 in. long, lateral pedicels ·04–·12 in. long; spikelets linear-oblong, flattish, ·24–·75 in. long, ·08–·12 in. wide; lemmas 19–50, lateral nerves strong..........14. *cilianensis.*

Both glumes 1-nerved:—

Spikelets ·4–1·5 in. long, ·08–·09 in. wide; glumes ·06–·08 in. long, acute; lemmas 10–70, ·07–·08 in. long. Culms 6–32 in. high; leaves 3·5–7·5 in. long, ·1 in. wide; panicles ovate, diffuse, 4–12 in. long................15. *tremula.*

Spikelets up to ·8 in. long; lemmas 6–15:—

Panicles rather stiff; lateral pedicels usually less than ·12 in. long:—

Glumes subequal or the upper only slightly the longer. Leaves 1·5–7 in. long, ·08–·18 in. wide, margins often glandular, mouths of sheaths bearded. Culms 3–22 in. high, tufted; panicles oblong, open, 3–7 in. long; spikelets pale green to dark purplish or olive-grey, ·13–·3 in. long, ·08 in. wide; glumes ·04–·07 in. long; lemmas ·07–·08 in. long; grain globose or ellipsoid-globose, ·025–·035 in. long
16. *poaeoides.*

Leaves 1–7 in. long, ·1 in. wide, margins never glandular, mouths of sheaths naked. Culms 9–19 in. high; panicles oblong, 1·5–6 in. long; spikelets ·2 in. long, ·04–·05 in. wide; glumes ·04–·05 in. long; lemmas ·05 in. long; grain subglobose, ·025 in. long........................17. *Rottleri*.

Lower glume ·02–·025 in. long, upper ·05 in. long. Culms very slender, 2–18 in. high; leaves rather rigid, ·4–4·8 in. long, ·04–·1 in. wide, margins sometimes glandular; panicles oblong, open, 1·5–3·5 in. long; spikelets ·3–·6 in. long, ·05 in. wide; lemmas ·06–·07 in. long; grain oblong, truncate at both ends, dorsally flattened and grooved, ·02–·03 in. long 18. *Willdenoviana*.

Panicles lax, branches slender, flexuous or flaccid; lateral pedicels ·12–·36 in. long; lateral nerves of lemmas faint:—

Leaves 2–13·5 in. long, ·1–·12 in. wide, mouths of sheaths naked. Culms 4–36 in. high; panicles oblong to lanceolate, 2–6·5 in. long, branches solitary or 2-nate; spikelets ·3–·8 in. long, ·06–·08 in. wide; glumes hyaline, lower ·02–·025 in. long, obtuse, upper slightly longer, truncate; lemmas obtuse, ·07–·08 in. long; grain oblong, dorsally grooved, ·05–·06 in. long..............................19. *tenuifolia*.

Mouth of sheaths bearded; grain ·03–·04 in. long; branches of panicles often whorled:—

Spikelets ·16–·3 in. long, ·04 in. wide. Culms 2–24 in. high; leaves 2–9 in. long, ·1–·12 in. wide; panicles oblong or pyramidal, open or contracted, 4–13 in. long; lower glume ·025–·03 in. long, upper ·05–·06 in. long; lemmas ·08 in. long; grain ellipsoid, base laterally apiculate, ·04 in. long..................................20. *pilosa*.

Spikelets ·16–·24 in. long, ·08 in. wide. Culms 7–30 in. high; leaves 3·5–17 in. long, ·1–·22 in. wide; panicles effuse, 8–16 in. long; glumes ·08–·1 in. long, upper slightly the longer; lemmas ·1 in. long; grain subquadrate, ·03 in. long 21. *nigra*.

Spikelets secund on a simple spike with a slender rhachis alveolate and hispidulous on the side on which the spikelets are inserted ; keels of paleas in all either winged or not :—

Leaves convolute or complicate, very slender, finely acuminate, puberulous above, 1–7·5 in. long. Culms 6–24 in. high ; spikes 4–11 in. long ; spikelets slightly to much compressed, linear to ovate-oblong, ·25–·8 in. long, ·08–·18 in. wide ; glumes ·07–·14 in. long, lower usually acuminate ; lemmas 13–53, orbicular or broader than long, convex, keeled, obtuse or apiculate, keels of paleas often distinctly winged ; grain broadly ellipsoid or subglobose, often obtusely trigonous, ·025 in. long....................22. *bifaria.*

Leaves glabrous above ; spikes 3–8·5 in. long ; keels of paleas not or very narrowly winged :—

Leaves flat or complicate, rather rigid, apex rounded, ·6–4 in. long, ·08–·12 in. wide. Culms 4–18 in. high ; spikelets nearly terete, ·24–·75 in. long, ·06–·1 in. wide ; glumes ·05–·06 in. long, obtuse or subacute ; lemmas 9–42, very broadly ovate, obtuse, ·08 in. long ; grain subglobose-ovoid, ·026 in. long ....23. *brachyphylla.*

Leaves convolute or complicate, 7–12·5 in. long, ·08–·1 in. wide. Culms 10–15 in. high ; spikelets ovate-lanceolate, much compressed, ·28–·3 in. long, ·1–·12 in. wide ; glumes ·06–·1 in. long, acute or acuminate ; lemmas 12–30, ·1–·11 in. long, obtuse or subacute ; grain ellipsoid-oblong, ·04 in. long......24. *Walkeri.*

1. ERAGROSTIS SPICATA, Jedwabn. *E. phleoides*, Stapf ; F. B. I. vii. 313.

Ganjam, Godavari and Salem Districts ; Bangalore ; up to 3,500 ft. Vern. *Kan.* Kadu nawanai hullu.

2. ERAGROSTIS CILIATA, Nees ; F. B. I. vii. 313.

Ganjam, Vizagapatam, Rampa and Godavari Districts.

3. ERAGROSTIS COARCTATA, Stapf. ; F. B. I. vii. 313.

East Coast Districts ; Mysore State ; up to 2,000 ft.

4. ERAGROSTIS CILIARIS, Link ; F. B. I. vii. 314.

Chittoor and S. Arcot Districts.

5. ERAGROSTIS RIPARIA, Nees. *E. tenella*, Roem., et Sch. var. *riparia*, Stapf ; F. B. I. vii. 315.

In most Districts ; sea-level to 3,000 ft.

A good fodder. Vern. *Kan.* Kadu kambu hullu.

6. ERAGROSTIS ASPERA, Nees ; F. B. I. vii. 314.

Kurnool, Salem, Coimbatore, Nilgiri, S. Arcot, Trichinopoli and Madura Districts ; sea-level to 2,000 ft.

7. ERAGROSTIS VISCOSA, Trin. *E. tenella*, Roem. et Sch. var. *viscosa*, Stapf; F. B. I. vii. 315.

In all Districts; sea-level to 2,500 ft.

Usually very sticky and scented. Said to be disliked by cattle. Vern. *Tel.* Bankasigarantha.

8. ERAGROSTIS PLUMOSA, Link. *E. tenella*, Roem. et Sch. var. *plumosa*, Stapf; F. B. I. vii. 315.

In all Districts; sea-level to 4,000 ft.

A good fodder liked by horses and cattle. Makes good light hay. Vern. *Tel.* Chinna garikai gaddi; *Kan.* Sanna purlai hullu.

9. ERAGROSTIS JAPONICA, Trin. *E. interrupta*, Beauv. var. *tenuissima*, Stapf; F. B. I. vii. 316.

Godavari, Nilgiri and Tinnevelly Districts; Mysore and Travancore States; up to 3,000 ft.

10. ERAGROSTIS DIARRHENA, Steud. *E. interrupta*, Beauv. var. *diarrhena*, Stapf; F. B. I. vii. 316.

In the Northern and Eastern Districts; Travancore; up to 1,000 ft.

Var. *Koenigii*, C. E. C. Fischer n. comb. *E. interrupta*, Beauv. var. *Koenigii*, Stapf; F. B. I. vii. 316; S. I. G. fig. 217.

Panicles with short dense branchlets.

In most Districts; sea-level to 3,000 ft.

Readily eaten by cattle. The culms are used for making brooms. Vern. *Tam.* Kanjara pullu; *Kan.* Kadu gasagasai hullu, Pini hullu.

11. ERAGROSTIS UNIOLOIDES, Nees. *E. amabilis*, W. et A.; F. B. I. vii. 317; S. I. G. fig. 218.

In all Districts; often in wet places; up to 7,000 ft.

The glumes are often purple or pink. Vern. *Tel.* Udara gaddi.

12. ERAGROSTIS GANGETICA, Steud. *E. elegantula*, Steud.; F. B. I. vii. 318.

In all Districts except on the W. Coast; up to 7,500 ft.

Readily eaten by cattle.

13. ERAGROSTIS NUTANS, Nees. *E. stenophylla*, Hochst.; F. B. I. vii. 318.

In all Districts; up to 2,000 ft.

Readily eaten by cattle in the absence of a better grass. Vern. *Ur.* Looha bena; *Tel.* Nakurmaral, Urenkai, Pedda garikai.

14. Eragrostis ciliaNensis, Link. *E. major*, Host.; F. B. I. vii. 320; S. I. G. figs. 221, 222.
In all Districts except on the W. Coast; up to 4,000 ft.
Said to be liked by cattle. Vern. *Kan.* Bettada akabu hullu.

15. Eragrostis tremula, Hochst.; F. B. I. vii. 320; S. I. G. figs. 219, 220.
Godavari, Kistna, Anantapur, S. Kanara and Tinnevelly Districts.
Said to be a good fodder, but the foliage is too scanty to yield much substance. The slender pedicels allow the spikelets to stir with the slightest movement of the air and in that respect it resembles the European Quaker-grass. The seeds are sometimes eaten by the poor.

16. Eragrostis poaeoides, Beauv. *E. minor*, Host.; F. B. I. vii. 321.
In the Northern, Central and Eastern Districts; up to 7,000 ft. Vern. *Tel.* Goob-bai gaddi; *Kan.* Dodda purlai hullu.

17. Eragrostis Rottleri, Stapf; F. B. I. vii. 321.
Tranquebar (Rottler).

18. Eragrostis Willdenoviana, Nees; F. B. I. vii. 322; S. I. G. figs. 223, 224.
In the Central and Eastern Districts from Kistna southwards. Vern. *Kan.* Kari jontu hullu.

19. Eragrostis tenuifolia, Hochst.; F. B. I. vii. 322.
Mysore State; Bellary, N. Coimbatore, Salem, Madura and Tinnevelly Districts; Nilgiri, Pulney and High Wavy Mountains; up to 7,000 ft. Vern. *Kan.* Thodda karakai hullu

20 Eragrostis pilosa, Beauv.; F. B. I. vii. 323; S. I. G. fig. 225.
In all Districts except on the W. Coast; up to 7,000 ft.
In some localities said to be much liked by cattle, elsewhere reported to be rejected. Vern. *Kan.* Kadu sanna samai hullu.

21. Eragrostis nigra, Nees; F. B. I. vii. 324.
N. Coimbatore, Nilgiri, Pulney and Tinnevelly Hills; 2,000–7,000 ft.

22. Eragrostis bifaria, Wight ex Steud.; F. B. I. vii. 325; S. I. G. fig. 227. *E. coromandeliana*, Trin.; F. B. I. vii. 326.
In all Districts; up to 4,000 ft.
Reported to yield good fodder. Vern. *Tel.* Gubbikal gaddi, Nooli gaddi, Wooda tallum; *Kan.* Kodi mara hullu, Nosai hullu.

23. Eragrostis brachyphylla, Stapf; F. B. I. vii. 327.
In the Central and Eastern Districts, from Vizagapatam to Coimbatore.

24. Eragrostis Walkeri, Stapf.
Kurnool District on Cumbum Hill (Bourne).

91. Halopyrum, Stapf

Tall, stout, perennial herbs; rootstock creeping, branched. sheathed; roots vermiform. *Leaves* convolute, narrow, rigid. *Panicle* ovoid, elongate; branches alternate, spiciform, short; pedicels not jointed on the branchlets. *Spikelets* large, many-flowered, strongly laterally compressed, sessile or shortly pedicelled, not jointed on the pedicels; rhachilla very short between the lemmas, jointed at the base and between the lemmas, not produced beyond the uppermost one, silky hairy. *Glumes* coriaceous, subequal, ovate-lanceolate, acuminate or apiculate, lower 1–3-nerved, upper 5-nerved. *Lemmas* coriaceous, distichously imbricate, ovate-oblong, cymbiform, 3-nerved; paleas as long, subacute, 2-keeled, each enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong or ellipsoid, compressed, more or less deeply hollowed or concavo-convex, free within the lemma and palea; embryo large.

Halopyrum mucronatum, Stapf; F. B. I. vii. 328.
Coast of Tinnevelly District and on Krusadai Island.
Culms 5–24 in. high; leaves 4–12 in. long; panicles 6–16 in. long; spikelets ·5–·9 in. long, 10–17-flowered; glumes ·3–·35 in. long. Vern. *Tam.* Uppukarai pullu.

92. Diplachne, Beauv.

Tufted herbs. *Leaves* narrow, flat or convolute. *Panicles* lax, erect, simple or nearly so, branches slender, simple. *Spikelets*

laterally compressed, sessile or subsessile, few- to many-flowered, not articulated at the base; rhachilla articulated between the lemmas, not prolonged beyond the terminal. *Glumes* membranous, the upper the longer, persistent, oblong-lanceolate, keeled, 1-3-nerved. *Lemmas* rather longer, thin, elliptic-oblong, tip 2-4-toothed 1-3-nerved, mucronate or awned, keeled; paleas oblong, 2-keeled, containing each a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* ovoid-oblong, subtrigonous, free within the lemma and palea.

DIPLACHNE FUSCA, Beauv.; F. B. I. vii. 329.

Kistna, Anantapur, Malabar and Tinnevelly Districts; Travancore State; at low elevations.

Culms up to 5 ft. high; leaves 4–18 in. long, rarely flat; panicles 3·5–13 in. long; spikelets 4–13-flowered, ·24–·5 in. long; glumes ·08–·11 in. long; lemmas ·12–·14 in. long, margins and margins of paleas hairy.

Buffaloes are said to eat it readily. Vern. *Tam.* Mandi pillu.

93. Dichaetaria, Nees ex Steud.

Slender perennial herbs. *Leaves* narrow, flat. *Panicles* of a few racemes on a long simple axis. *Spikelets* few, distant, 1-flowered, narrow, terete, pedicelled, not jointed at the base; rhachilla jointed at the base, produced beyond the lemma into a filiform arista bearing a minute empty glume below the middle. *Glumes* 2, equal or unequal, lanceolate, acuminate, 3-nerved, the upper subaristate, separately deciduous. *Lemma* much longer, very narrow, apex bifid with a long recurved awn from the sinus, 3-nerved; callus elongate, bearded; palea as long, finely acuminate, entire or minutely 2-toothed, 2-nerved, containing a bisexual floret. *Lodicules* 2, fleshy. *Stamens* 3. *Styles* 2, free. *Grain* very narrow.

DICHAETARIA WIGHTII, Nees ex Steud.; F. B. I. vii. 300.

Tranquebar (Rottler); rare.

Culms 1–2 ft. high; leaves nearly as long, ·1–·3 in. wide, mostly basal; panicles 8–18 in. long; racemes slender, up to 4 in. long; glumes ·3–·4 in. long; lemmas ·6–·7 in. long; awns ·9–1 in. long.

94. Oropetium, Trin.

Dwarf, densely tufted, annual or perennial herbs. *Leaves* setaceous. *Spikes* solitary, terminal, slender, 2-ranked. *Spikelets* solitary, sessile, more or less sunk in the alternatingly distichous hollows in the rhachis, 1–4-flowered; rhachilla slender, disarticulating above the glumes and between the lemmas, when more than one. *Glumes* 2, subequal and persistent in the uppermost spikelet if more than one, otherwise the lower glume very small or 0; upper narrow, rigid, sometimes closing the hollow of the rhachis and concealing the florets. *Lemmas* hyaline, ovate to oblong, 1–3-nerved; paleas as long, 2-keeled, containing a bisexual floret or, when more than one, the uppermost rudimentary. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong, terete, free within the lemma and palea.

OROPETIUM THOMAEUM, Trin.; F. B. I. vii. 366; S. I. G. fig. 228.
Rottboellia Thomaea, Koen.; Roxb. Cor. Pl. t. 132, lower fig.

In all the drier localities; sea-level to 4,000 ft.

Whole plant not exceeding 4 in. high, forming hard tussocks; leaves ·25–1 in. long, often curved, more or less hairy; spikes ·4–1·5 in. long; rhachis compressed, undulating; upper glumes ·08–·12 in. long; lemmas semicircular, ·05 in. long.

95. Microchloa, R. Br.

Slender, usually perennial, tufted herbs. *Leaves* filiform, convolute, subsetaceous, pungent, the lower curved. *Spikes* solitary, terminal, very slender, often curved. *Spikelets* all alike, very small, 1-flowered, alternate and secund in two closely approximate rows, erect, not articulated at the base; rhachilla disarticulating above the glumes, not prolonged beyond the lemma. *Glumes* 2, subequal, subpersistent, lanceolate-oblong, 1-nerved, keeled, cuspidate or acuminate. *Lemmas* much smaller, hyaline, oblong; palea nearly as long, 2-keeled, containing a bisexual floret. *Lodicules* 2, truncate. *Stamens* 3. *Styles* 2, free. *Grain* oblong, fusiform, free within the lemma and palea; embryo $\frac{1}{4}$–$\frac{1}{2}$ as long.

MICROCHLOA INDICA, Beauv. *M. setacea*, R. Br.; F. B. I. vii. 283.

Rottboellia setacea, Roxb. Cor. Pl. t. 132, upper fig.

Godavari and Bellary Districts; Mysore State; Nilgiri and Pulney Hills; sea-level to 6,500 ft.; often growing on walls. Culms very slender, 1–18 in. high; leaves ·4–3·5 in. long; spikes 1–7 in. long, purplish; rhachis rounded on the back, channelled in front, with the sessile spikelets inserted on either margin; glumes ·1 in. long. Vern. *Tel.* Nagavamu gaddi; *Kan. Navalu bannada hullu.*

96. Melanocenchris, Nees

Small, tufted, annual or perennial herbs. *Leaves* rigid, flat or convolute. *Inflorescence* of sessile or shortly peduncled clusters of 4–5 spikelets secund on a flattened, terminal, solitary axis. *Spikelets* sessile, not articulated at the base, 2-flowered; rhachilla jointed at the base and between the lemmas, prolonged beyond the upper and sometimes bearing 1–2 empty scales (abortive lemma and palea of a third floret). *Glumes* 2, coriaceous, narrow, persistent, attenuated into a scabrous arista, the upper broader, with hyaline margins. *Lemmas* thinly membranous, cymbiform or broadly ovate, acute, entire and cuspidate or 3-cuspidate, keeled or nearly flat; paleas narrow, 2-cuspidate, 2-keeled, the lower containing a bisexual floret, the upper a ♂. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong, free within the lemma and palea.

Perennial; culms 6–17 in. high; leaves flat, linear or ensiform, mostly aggregated at the base, in elongated culms, narrower cauline ones also present, ·7–4 in. long, ·05–·17 in. wide; rhachis 1·5–3·6 in. long; glumes (including aristas) ·23–·31 in. long, edges densely ciliate; rhachilla puberulous; lemmas ·16–·18 in. long, entire or minutely 2-toothed, cuspidate; paleas 2-toothed, back between the keels channelled; grain linear-oblong ....1. *monoica.*
Annual; culms 2–7 in. high; leaves convolute, very narrow, ·4–1·7 in. long, not aggregated at base; rhachis ·7–1·3 in. long; rhachilla glabrous; lemmas ·18–·21 in. long, shortly 3-aristate; paleas 2-cuspidate, back between the keels flat; grain elliptic, obtuse, compressed plano-convex; glumes as in *monoica*...........2. *Royleana.*

1. MELANOCENCHRIS MONOICA, C. E. C. Fischer n. comb. non O. Ktz. *Gracilea mutans,* Koen.; F. B. I. vii. 283; S. I. G. fig. 187. In dry localities from the Kistna River to S. Arcot; Nilgiri District (Perrottet); up to 2,000 ft.

2. Melanocenchris Royleana, Nees. *Gracilea Royleana*, Hook. f.; F. B. I. vii. 284; S. I. G. fig. 188.
Mysore State; Guntur, Bellary, Cuddapah, Chingleput and Kollegal Districts; in dry localities; up to 2,000 ft.

97. Tripogon, Roth

Slender, often densely tufted herbs. *Leaves* mostly basal, very narrow, usually convolute. *Spikes* terminal, solitary, slender. *Spikelets* uniform, sessile, unilaterally 2-seriate, few–many-flowered, not articulated on the rhachis; rhachilla produced between the lemmas, not prolonged beyond the terminal, jointed at the base. *Glumes* membranous, 1-nerved; the lower usually lodged in a furrow of the rhachis, 1-toothed or -lobed on one side; the upper longer, entire or notched at the tip, mucronate or aristate, inserted distinctly higher on the rhachilla. *Lemmas* ovate, dorsally convex, 2-fid and awned from the sinus or 4-fid with the outer lobes awned, the inner lobes membranous and rarely awned, rarely truncate and muticous, 3-nerved; paleas broad or narrow, complicate, usually truncate, keels ciliate, each containing a bisexual floret except the 1 or 2 terminal which are imperfect. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* very narrow, free within the lemma and palea.

Culms simple, slender, not thickened by the old sheaths; leaves not equitant, rigid or pungent :—
  Lemmas 2-fid or entire :—
    Lemmas 2-fid, awned or aristate from the sinus :—
      Lemmas distinctly shorter than their awns :—
        Awns finely capillary, flexuous, ·8–1 in. long; lowest lemma ·08–·1 in. long, 2-fid, lobes acute; paleas not winged. Culms very slender, 1·5–7 in. high; leaves 1·5–10 in. long; spikes 6–14 in. long; spikelets remote, few-flowered; glumes cuspidate or aristate .... 1. *capillatus.*
        Awns geniculate or straight, not flexuous, ·3–·6 in. long :—
          Lobes of lemma with aristas ·16–·22 in. long; lemmas puberulous, ·11–·14 in. long; awns geniculate, ·42–·6 in. long; paleas not winged. Culms slender, ·5–3 in. high; leaves 1–2 in. long; spikes ·3–2·5 in. long; spikelets well separated, few-flowered; glumes acuminate, upper ·13–·2 in. long .... 2. *pauperculus.*
          Lobes of lemma triangular, acute, lemma ·2–·25 in. long,

awn not geniculate, curved, ·3–·36 in. long; paleas broadly winged. Culms 4–12 in. high; leaves 3–7·5 in. long; spikes 3–9 in. long; spikelets approximate, many-flowered, ·5–1·5 in. long; glumes often 2-toothed and mucronulate, upper ·22–·3 in. long ....3. *Wightii.*

Lemma longer than its arista, ·13–·16 in. long, lobes obtuse, arista ·08–·12 in. long; paleas narrowly winged. Culms 7–15 in. high; leaves 2–7·5 in. long; spikes 2–9 in. long; spikelets ·3–·9 in. long, many-flowered; glumes acute, upper ·13–·16 in. long..........................4. *Jacquemontii.*

Lemmas rounded or truncate and minutely 3-toothed, ·1 in. long, muticous or with 1 short arista; paleas not winged. Culms 1–4 in. high; leaves ·5–3 in. long; spikes 1–3·5 in. long; spikelets 1–2-flowered; glumes coriaceous, obtuse, upper ·13 in. long 5. *Roxburghianus.*

Lemmas 4-fid, ·08–·15 in. long, 2 inner lobes short, acute, with an arista from the sinus ·08–·13 in. long, 2 outer short, bearing aristas ·07–·1 in. long; paleas not winged. Culms 4–24 in. high; leaves 3–15 in. long, glabrous to densely hairy; spikes 2–11 in. long; spikelets usually close, several-flowered; glumes notched or 2-fid, upper ·16–·23 in. long ....6. *bromoides.*

Culms branched, thickened below by the imbricate, old leaf-sheaths, slender and exserted above, 1–8 in. long; leaves ·4–2 in. long, equitant, rigid, pungent, minutely hispidulous above; spikes 1·5–2·5 in. long; spikelets approximate, 7–9-flowered; glumes membranous, ·12–·16 in. long; lowest lemma ·1 in. long, 2-fid, its arista ·03–·04 in. long; paleas not winged ....7. *pungens.*

1. TRIPOGON CAPILLATUS, Jaub. et Spach.; F. B. I. vii. 285.
Mysore and Cochin States (Meebold); Wynaad (Beddome); 3,000–4,000 ft.; often epiphytic.

2. TRIPOGON PAUPERCULUS, Stapf; F. B. I. vii. 285.
Bababudan Hills and Mysore State (Meebold); Travancore at Peermade (Venkoba Rao); 2,000–6,000 ft.
Growing on trees and rocks.

3. TRIPOGON WIGHTII, Hook. f.; F. B. I. vii. 286.
Horsleykonda; Bellary District; Nilgiri Hills; Cochin and Travancore States; 1,000–6,000 ft.

4. TRIPOGON JACQUEMONTII, Stapf; F. B. I. vii. 286.
Nilgiri Hills; Coimbatore District; Travancore; up to 8,800 ft.

5. TRIPOGON ROXBURGHIANUS, Bhide. *Lepturus Roxburghianus*, Steud.; F. B. I. vii. 365.
   Guntur, Cuddapah, Anantapur and Bellary Districts.
   In dry places among rocks.
6. TRIGOPON BROMOIDES, Roth; F. B. I. vii. 287.
   W. Ghâts; Mysore State; Bellary, Cuddapa and Vellore Districts; Travancore; 1,000–7,500 ft.
   Often on rocks.
7. TRIPOGON PUNGENS, C. E. C. Fischer in Kew Bull. 1934, 170.
   S. Coimbatore District at Punachi in the Anamallais (Barber); Pulney Hills at Neutral Saddle (Bourne); 3,000–4,000 ft.

98. Enteropogon, Nees

Erect, sometimes tufted, perennial herbs. *Leaves* narrow, usually flat, the upper sometimes involute. *Spikes* slender, solitary or sometimes twin; rhachis flat or trigonous. *Spikelets* all alike, sessile, not jointed at the base, 1–3-flowered; rhachilla jointed at the base, continuous between the lemmas and prolonged beyond the uppermost. *Glumes* persistent, hyaline, acuminate, 1-nerved, keeled, the upper much the longer. *Lemmas* diminishing in length upwards, the lowest rather longer than the upper glume, chartaceous, 3-nerved, more or less keeled, entire or shortly 2-fid, awned from the sinus in continuation of the keel; paleas narrowly lanceolate, obtuse or 2-toothed, 2-keeled, keels scabrid, each containing a bisexual floret. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* narrow, free within the hardened lemma and palea.

ENTEROPOGON MONOSTACHYOS, K. Schum. *E. melicoides*, Nees; F.B.I. vii. 284; S. I. G. fig. 189.
In all Districts from Mysore State and Cuddapah southwards except on the W. Coast; sea-level to 2,000 ft.
Culms up to 3 ft. high, densely tufted; leaves 2·5–21 in. long, ·1–·25 in. wide; spikes 4–8 in. long; lower glume ·09–·14 in. long, upper ·22–·27 in. long; lowest lemma ·27–·31 in. long; awns ·24–·3 in. long. Vern. *Tam.* Kannai pillu.

99. Cynodon, Pers.

Perennial creeping grasses with erect culms. *Leaves* narrow, flat or complicate. *Inflorescence* of 2–8 fascicled or umbellate spikes;

rhachis slender. *Spikelets* all alike, sessile, laterally compressed, alternately 2-seriate, imbricate, not jointed at the base, 1-flowered; rhachilla disarticulating at the base, rarely produced beyond the lemma. *Glumes* 2, thin, keeled, acute or mucronate, persistent or separately deciduous. *Lemmas* broader than the glumes, firmly membranous, boat-shaped, 3-nerved, keel ciliate, awnless; paleas 2-keeled, containing a bisexual floret. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong, free within the lemma and palea.

Lemmas longer than the upper glumes, broadly boat-shaped, ·08–·1 in. long:—

Erect culms 2–18 in. high; lower leaves usually flat, the upper often complicate, ·4–4·7 in. long, ·03–·11 in. wide; spikes 3–7, ·6–2·5 in. long, usually more or less erect; lower glume ·05–·08 in. long..1. *dactylon.*

Erect culms 7–40 in. high; leaves narrowly ensiform, flat, 1–4·5 in. long, ·18–·27 in. wide; spikes 3–6, usually spreading and curved, 2–4 in. long; lower glumes ·04 in. long, upper ·05–·06 in. long var. *intermedius.*

Lemmas shorter than or equalling the upper glume, narrowly boat-shaped, ·08 in. long, the ciliae on the keel often minutely knobbed. Erect culms 4–9 in. high; leaves flat, ·6–2·5 in. long, ·1–·2 in. wide: spikes 3–5, ·6–2·2 in. long; lower glume ·04–·08 in. long, upper ·08–·1 in. long 2. *Barberi.*

1. Cynodon dactylon, Pers.; F. B. I. vii. 288; S. I. G. figs. 190, 191.

In all Districts except on the W. Coast; sea-level to 7,000 ft. Underground stems often very long. Hariali grass.

A highly nutritious fodder, especially for horses. Vern. *Hind.* Dub; *Ur.* Dubbula ghanso; *Tel.* Gericha gaddi, Gurka hariali; *Tam.* Arugam pillu; *Kan.* Kudi garikai, Karkeri hullu.

Var. *intermedius*, C. E. C. Fischer n. comb. *C. intermedius*, Rang. et Tad.; S. I. G. figs. 192, 193.

Usually without underground stem.

In the same localities as the typical species but less common; up to 3,000 ft. The extreme forms are easily recognized, but the intermediate are not readily distinguishable.

2. CYNODON BARBERI, Rang. et Tad.; S. I. G. figs. 194, 195.
In the same region as the former species, but less common: not reported from Travancore.

100. Chloris, Sw.

Perennial, rarely annual, erect or decumbent herbs. *Leaves* usually flat, sometimes complicate or convolute. *Inflorescence* of solitary, umbelled or racemosely arranged spikes or spiciform racemes, erect or stellately spreading. *Spikelets* sessile or very shortly pedicelled, unilateral, 2-seriate, not jointed on the rhachis, with 1–4 perfect florets and 1–3 imperfect above; rhachilla articulated above the glumes, prolonged beyond the upper perfect floret and bearing 1–3 empty lemmas above. *Glumes* 2, membranous, unequal, persistent, narrow, 1-nerved, keeled, mucronate or the upper more or less aristate. *Lemmas* 3-nerved, acute, obtuse or 2-fid, usually awned; paleas 2-nerved, 2-keeled, containing a bisexual floret. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* linear-oblong or ellipsoid, compressed or subtrigonous, free within the lemma and palea; often with a loose pericarp.

Spikes solitary, very rarely 2, ·8–2·5 in. long, erect. Culms slender, 5–18 in. high; leaves 2–10 in. long; ·1–·15 in. wide; perfect florets 4, lowest lemma ·2 in. long, broadly obovate, truncate with an arista ·12–·14 in. long, that of next longer, of the 4th very short or 0; empty lemmas 2, muticous ....1. *tenella.*

Spikes 3–many; perfect florets 1–2 :—
  Spikes umbelled :—
    Perfect floret 1 :—
      Empty lemma above the floret solitary, well-developed or rudimentary :—
        Empty lemma represented by a fine arista ·18–·5 in. long hardly widened at the base. Culms procumbent or erect, 1–5 ft. high; peduncles long; leaves 2–22 in. long, ·07–·4 in. wide; spikes 3–10, 2–10·5 in. long; upper glumes ·2–·38 in. long; lemma oblong-lanceolate, glabrous, ·17–·28 in. long; awn ·12–·6 in. long ....2. *incompleta.*

        Empty lemma oblanceolate, truncate, its arista ·16–·18 in. long. Culms decumbent, 3–18 in. high; leaves 1·5–7 in. long, ·07–·11 in. wide; spikes 4–7, ·8–2·5 in. long; rhachis hairy; upper glumes ·08–·16 in. long; lemma obovate, acute,

·1–·12 in. long, apical margin long-ciliate; awn ·15–·26 in. long .... 3. *virgata.*

Empty lemmas above the floret 2 or 3:—

Culms glabrous, 1–3 ft. high; leaves 2–12 in. long, ·1–·2 in. wide; spikes 4–20, 2–4 in. long, rhachis scaberulous; upper glumes ·1–·13 in. long; lemma ·08–·1 in. long, obovate, obtuse, back sparsely hairy, margins densely ciliate above the lower ⅓, its arista ·16 in. long; empty lemmas 2, lower obovate, upper subglobose, their aristas ·12–·18 in. long 4. *barbata.*

Culms puberulous or hairy for at least a short distance below the spikes:—

Culms 3–30 in. high, hairy for a short distance below the spikes; leaves 1–10 in. long; ·02–·1 in. wide, glabrous; spikes 3–13, ·6–2·8 in. long, rhachis glabrous; upper glumes ·08–·13 in. long; lemma obovate to oblanceolate, keel glabrous, back sparingly hairy at the sides, margins long-ciliate, ·08–·1 in. long; awn ·16–·34 in. long; empty lemmas 2–3, lower obovate, truncate, upper subglobose, their aristas ·1–·3 in. long .... 5. *montana.*

Culms 3–8 in. long, usually puberulous throughout, sometimes hairy above; leaves ·7–1·5 in. long, ·05–·1 in. wide, densely short-hairy; spikes 3–4, ·5–1 in. long, rhachis densely hairy; upper glumes ·08–·1 in. long; lemma obovate, obtuse, emarginate or 2-toothed, back asperulous, keels and margins long-ciliate, ·1 in. long; awn ·2–·3 in. long; empty lemmas 3, obovate, apiculate, puberulous, their awns ·2–·3 in. long ...... 6. *Wightiana.*

Perfect florets 2. Culms 1–3 ft. high, minutely puberulous just below the spikes; leaves 1–10 in. long, ·05–·2 in. wide, glabrous; spikes 3–9, 1·4–4 in. long; upper glume ·07–·1 in. long; lowest lemma obovate, back scaberulous, keel and margins long-ciliate, ·09–·16 in. long, awn ·16–·23 in. long; second lemma broader, shorter with a shorter awn; empty lemmas 2, subglobose, their aristas ·08–·18 in. long .... 7. *Bournei.*

Spikes racemosely arranged, 14–30, 1·5–2·5 in. long. Culms 18–30 in. high; leaves 2–6·5 in. long, ·1–·15 in. wide; upper glume ·06 in. long; perfect lemma solitary, ·06–·09 in. long, narrowly lanceolate, acute, 2-toothed, sparsely ciliate on the keel and margins above the middle, its awn ·33–·44 in. long; empty lemmas 2, minute, their awns ·25–·4 in. long .... 8. *polystachya.*

1. CHLORIS TENELLA, Roxb.; F. B. I. vii. 290; S. I. G. fig. 197.
   Bellary District.
   Reputed a good fodder.
2. CHLORIS INCOMPLETA, Roth; F. B. I. vii. 290; S. I. G. fig. 196.
   In all Districts except on the W. Coast; often in hedges and scrambling among bushes; sea-level to 2,500 ft.
   Eaten by cattle before flowering. Vern. *Tel.* Kanthari gaddi; *Kan.* Melamalai hullu.
3. CHLORIS VIRGATA, Sw.; F. B. I. vii. 291; S. I. G. fig. 198.
   Bellary and Salem Districts; Mysore State; 2,000–3,000 ft.
   Vern. *Tel.* Uppu gaddi.
4. CHLORIS BARBATA, Sw.; F. B. I. vii. 292; S. I. G. figs. 199, 200, 201.
   In all Districts except on the W. Coast; sea-level to 2,000 ft.
   A good fodder before flowering. Vern. *Tam.* Kodai pillu, Sevarugu pullu; *Kan.* Hennu manchada kalu hullu.
5. CHLORIS MONTANA, Roxb.; F. B. I. vii. 292; S. I. G. figs. 204, 205.
   In the central and eastern Districts and southwards to Cape Comorin; sea-level to 2,000 ft. Vern. *Kan.* Kondai javara hullu.
6. CHLORIS WIGHTIANA, Nees; F. B. I. vii. 293.
   S. India, without precise locality (Wight).
7. CHLORIS BOURNEI, Rang. et Tad.; S. I. G. figs. 202, 203.
   Godavari, Bellary, S. Arcot, Coimbatore and Tanjore Districts; up to 2,500 ft.
8. CHLORIS POLYSTACHYA, Roxb. ; F. B. I. vii. 292.
   Bellary District; Nilgiri, Coimbatore, Pulney and Tinnevelly Hills; Cape Comorin; up to 2,500 ft.

101. Eleusine, Gaertner

Annual or perennial herbs. *Leaves* flat or complicate. *Inflorescence* of capitate, digitate, whorled or scattered spikes. *Spikelets* small, sessile, 2–3-seriate, secund, imbricate, pointing forwards at an acute angle to the rhachis, with a terminal spikelet or sometimes only an abortive lemma; laterally compressed, not jointed to the rhachis; rhachilla continuous between the 2–12 lemmas. *Glumes* persistent, subequal, keeled, acute or cuspidate; lower 1-nerved ;

upper often broader, 1–7-nerved. *Lemmas* resembling the glumes; the lowest usually the longest, 3-nerved; paleas complicate, strongly 2-keeled, each containing a bisexual floret or the terminal a ♂ or empty. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* small, free within the lemma and palea; pericarp loose, hyaline.

Erect; leaves 3 in. or more long; spikes umbelled or scattered; lemmas and paleas glabrous:—

Spikes in one whorl, occasionally 1–2 solitary spikes below the umbel; glumes entire:—

Rhachis of spike slender, glabrous. Culms not very stout, 6–30 in. high; leaves 3–20 in. long, ·1–·25 in. wide; spikes 2–9, ·9–5·5 in. long; lowest lemma ·12–·14 in. long; paleas not winged; grain oblong, narrowed at the ends, laterally compressed. 1. *indica*.

Rhachis broad, margins scabrid. Culms usually stout, 1–3 ft. high; leaves 10–24 in. long, ·2–·5 in. wide; spikes 4–many, 1–4 in. long; lowest lemma ·15–·17 in. long; paleas winged on the keels; grain globose ....2. *coracana*.

Spikes 4–30 in 1–several whorls with scattered solitary or twin spikes intermixed, 1·5–5 in. long; rhachis slender. Culms 1–4 ft. high; leaves 3–10 in. long, ·1–·5 in. wide; glumes usually with notched tips; lowest lemma ·11–·14 in. long, truncate or 2-toothed caudate; paleas with ciliolate, wingless keels; grain oblong-subglobose, grooved down one side, rugose and muriculate 3. *verticillata*.

Prostrate or creeping, spreading and rooting from the nodes; culms 1–9 in. high; leaves ·5–1·2 in. long, ·05–·15 in. wide; spikes numerous, crowded into a globose head, ·3–·5 in. across; lowest lemma ·15–·17 in. long, cuspidate, densely hairy on the keel and on the 2 lateral nerves below the middle; paleas densely hairy on the keels; grain ovate to nearly orbicular, concavo-convex, transversely rugose..4. *lagopoides*.

1. Eleusine indica, Gaertn.; F. B. I. vii. 293; S. I. G. fig. 206.

In all Districts; up to 6,500 ft.

A fair fodder. Vern. *Tam.* Thippa ragi.

2. Eleusine coracana, Gaertn.; F. B. I. vii. 299.

Cultivated in the dry and hilly parts of most Districts; up to 5,000 ft. Believed to be the cultivated form of the previous species.

The grain is an important article of food for the poorer classes. The culms and leaves are a good cattle-fodder.

Vern. *Ur.* Mandiya ; *Tel.* Ragi, Ragulu, Thamidalu, Chodalu ; *Tam.* Ragi, Kalvaragu, Kapai ; *Kan.* Ragi.

3. ELEUSINE VERTICILLATA, Roxb. ; F. B. I. vii. 295.
   In all the eastern Districts ; Mysore State ; Nilgiri and Coimbatore Districts ; up to 3,000 ft.
   A good fodder. Vern. *Tam.* Kadu kapài.

4. ELEUSINE LAGOPOIDES, Merr. ; *E. brevifolia*, R. Br. ; F. B. I. vii. 294 ; S. I. G. fig. 207.
   Along the E. coast and inland as far as Coimbatore ; usually in sandy tracts and salt soils ; up to 1,500 ft.

102. Dactyloctenium, Willd.

Annual or perennial, usually erect herbs. *Leaves* flat. *Spikes* in one terminal umbel, rarely reduced to a solitary spike. *Spikelets* sessile, laterally compressed, densely imbricate in 2 rows, usually at right angles to the rhachis, which is produced in a rigid point beyond them ; rhachilla disarticulating above the lower glume, continuous between the lemmas. *Glumes* deciduous, slightly unequal, 1-keeled, 1-nerved ; lower ovate to oblong, acute or obtuse, persistent ; upper oblong, obtuse, mucronate or cuspidate. *Lemmas* 3–5, firmly membranous, ovate, 1-keeled, 3-nerved, acuminate, mucronate or cuspidate ; paleas 2-keeled, each containing a bisexual floret or the uppermost more or less imperfect. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grains* oblong to globose ; pericarp loose.

DACTYLOCTENIUM AEGYPTIUM, Beauv. *Eleusine aegyptiaca*, Desf. ; F. B. I. vii. 295 ; S. I. G. figs. 5, 208, 209.
   In all Districts ; up to 3,000 ft.
   Erect or creeping in poor soils ; culms 1·5–30 in. high ; leaves 1–10 in. long, ·08–·35 in. wide, glabrous or more or less pilose ; spikes 1–7, digitately radiating, ·3–1·5 in. long ; lemmas broad, subfalcate, strongly cuspidate, lowest ·12–·14 in. long.

103. Dinebra, Jacq.

Annual herbs ; culms leafy. *Leaves* flat. *Inflorescence* of slender, spreading or deflexed spikes collected in narrow, pyramidal racemes, sometimes panicled. *Spikelets* crowded, secund, 2-seriate, sessile, 2–3-flowered, not jointed at the base ; rhachilla slender, jointed at the base, produced beyond the uppermost floret and bearing an

imperfect lemma. *Glumes* 2, persistent, subequal or the upper longer, lanceolate, 1-nerved, 1-keeled, awned or cuspidate. *Lemmas* much shorter, hyaline, broadly ovate, subacute or obtuse, 1-nerved; paleas as long, hyaline, 2-keeled. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong or ovoid, trigonous, free within the lemma and palea; embryo ⅓ as long.

DINEBRA RETROFLEXA, Panz. *D. arabica*, Jacq.; F. B. I. vii. 297; S. I. G. figs. 17, 210, 211.

In the central and eastern Districts from Godavary to Coimbatore; up to 3,000 ft.

Culms 2–36 in. high; leaves 2–10 in. long, ·1–·3 in. wide; inflorescence 3–16 in. long; spikes ·3–2·5 in. long; glumes rigid, ·18–·21 in. long; lemmas ·08–·1 in. long; grains ·05 in. long, acute.

Readily eaten by cattle before flowering. Vern. *Tel.* Wadata toka gaddi; *Kan.* Nari balada gandu hullu.

104. Enneapogon, Desv.

Perennial herbs. *Leaves* narrow, flat or convolute. *Panicles* contracted or spiciform. *Spikelets* distichous, 1–3-flowered, not jointed on the pedicels; rhachilla disarticulating at the base. *Glumes* 2, persistent, keeled, 3–9-nerved. *Lemmas* 4–5, shorter, broad, concave, 9-nerved, 9-awned; awns subulate, equal or alternately shorter and longer, plumose, ciliate or scaberulous; paleas oblong, 2-toothed, 2-keeled, the lowest containing a bisexual floret, the rest gradually shorter and with a ♂ floret or empty, the uppermost rudimentary or reduced to a tuft of hairs. *Lodicules* 2, minute, fleshy. *Stamens* 3. *Styles* 2, free. *Grain* ovoid or oblong, free.

ENNEAPOGON ELEGANS, Stapf. *Pappophorum elegans*, Nees; F.B.I. vii. 301; S. I. G. figs. 215, 216.

In all central and eastern Districts from Kurnool southwards; Coimbatore and Nilgiri Districts; up to 3,000 ft.

Culms slender, wiry, 2–20 in. high, erect from a woody, often thickened base; leaves flat or convolute ·9–5 in. long, ·05–·1 in. wide; panicles 2–3·5 in. long; glumes ·16–·22 in. long; lowest lemma ·08 in. long, its awns ·13–·14 in. long, the uppermost minute, usually reduced to 3 short aristas.

105. Pommereulla, Linn. f.

Perennial creeping herbs; rootstock stoloniferous. *Leaves* linear, flat or complicate; basal sheaths equitant. *Spike* terminal, simple or forked; rhachis flattened. *Spikelets* distant or close, sessile, 2–3-flowered; rhachilla articulated at the base, very short, continuous between the lemmas, shortly produced beyond the uppermost floret, with or without a rudimentary lemma. *Glumes* membranous, persistent, amplexicaul at the base; the lower 1-nerved; the upper broader and longer, 3-nerved. *Lemmas* 5–6, spirally arranged to form an inverted cone; the lowest with a pungent callus; the 2 lowest epaleate and empty, flabelliform, embracing the upper, 4-lobed, lobes acute, acuminate, mucronate, cuspidate or shortly aristate, the 2 inner narrow, the 2 outer broad, the lemma bearing a slender awn on the middle of the back; the upper lemmas gradually smaller, similar but concave at the base, 3-lobed with the middle lobe entire or 2-cuspidate, the third and fourth or third to fifth lemmas paleate; paleas ovate, flat, 2-keeled with wide flaps, containing each a bisexual floret; the uppermost lemma epaleate and empty. *Lodicules* 2. *Stamens* 2–3. *Styles* 2, free. *Grain* oblong, biconvex or plano-convex, loose within the lemma and palea; pericarp loose; embryo orbicular, small.

POMMEREULLA CORNUCOPIAE, Linn. f.; F. B. I. vii. 300; Roxb. Cor. Pl. t. 131; S. I. G. figs. 213, 214.

Vizagapatam (Narayanswami), Kistna (Barber) and Chingleput Districts.

Stolons several inches long; culms solitary or tufted, 1·5–12 in. high; leaves ·5–4 in. long, ·05–·15 in. wide, apex rounded; spikes partly enclosed in the upper spathiform leaf-sheath or long exserted, ·8–3 in. long; glumes ·3–·5 in. long; callus ·08–·1 in. long, villous; lowest lemma ·25–·33 in. long, silkily villous on the nerves, its awn ·2–·3 in. long; grain ·06 in. long.

106. Elytrophorus, Beauv.

Erect, annual herbs. *Leaves* very narrow, flat. *Inflorescence* of densely-packed globose clusters of spikelets continuous in a cylindric mass, lobed or interrupted, on a simple terminal axis. *Spikelets*

very small, laterally compressed, sessile, not articulated at the base, 3–6-flowered, subtended by many empty glumes; rhachilla very short, smooth, jointed at the base and between the lemmas. *Glumes* 2, subequal, persistent, membranous, lanceolate, mucronate or aristate, 1-keeled, 1-nerved. *Lemmas* 3–7, rather larger, ovate, aristate, 3-nerved; paleas complicate, truncately 3-lobed, 2-keeled, one or both keels winged, the uppermost empty, the rest containing each a bisexual floret. *Lodicules* 2. *Stamens* 1–3; anthers minute. *Styles* 2, free. *Grain* minute, narrowly oblong or fusiform, compressed; pericarp loose at both ends.

ELYTROPHORUS SPICATUS, A. Camus. *E. articulatus*, Beauv.; F. B. I. vii. 306.

Ganjam, Chingleput, Arcot, Tanjore and Malabar Districts; Mysore State; sea-level to 3,000 ft.

Culms ·05–12 in. high; leaves 1–12 in. long, ·05–·2 in. wide; inflorescence 1·5–9 in. long; glumes and lemmas ·06–·08 in. long, their aristas ·05–·09 in. long. Vern. *Tam.* Vayal tenai; *Kan.* Nela antabu hullu.

107. **Aeluropus**, Trin.

Low, much-branched, rigid, perennial, leafy herbs. *Leaves* distichous, coriaceous, usually convolute, pungent. *Inflorescence* of terminal crowded heads. *Spikelets* minute, sessile, laterally compressed, 6–many-flowered, not articulate at the base; rhachilla obscurely articulate at the base and between the lemmas, not produced beyond them. *Glumes* membranous, persistent, rounded on the back, apiculate, mucronate or cuspidate; lower 1–3-nerved; upper much larger, 5–7-nerved. *Lemmas* membranous, longer than the glumes, 7–9-nerved; paleas as large, broadly cuneate, 3-lobed, lobes erose, 2-keeled, flaps broad, keels nearly smooth or ciliate, each enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong or obovoid, free within the lemma and palea.

AELUROPUS LAGOPOIDES, Trin. ex Thw. *A. villosus*, Trin.; F. B. I. vii. 334.

Coastal sands and alkaline soils on both coasts; often in marshy places.

Roots long, wiry; culms tufted, 1–14 in. high; leaves sometimes flat, ·15–2 in. long, up to ·15 in. wide; heads oblong or globose, ·3–·8 in. long; glumes and lemmas more or less villous, the former ·06–·08 in. long, the latter ·1–·11 in. long.

108. Oryza, Linn.

Tall, annual or perennial herbs. *Leaves* narrow, flat or convolute. *Inflorescence* spicate or panicled. *Spikelets* strongly laterally compressed, 1-flowered, appearing to be articulated on a short dilated pedicel but actually articulated above 2 abortive glumes. *Glumes* above the articulation 2, minute, subulate or absent. *Lemma* chartaceous or coriaceous, the size and shape of the spikelet, often strongly nerved or ribbed, obtuse, acute or awned, its palea as long, similar, containing a bisexual floret. *Lodicules* 2, entire or 2-lobed. *Stamens* 6. *Styles* 2, free. *Grain* narrowly oblong, free within the lemma and palea.

Lemma, excluding its awn, ·35 in. or less long, punctate or granulate, not winged on the back:—

Panicles compound, 2·5–12 in. long, spikelets numerous; glumes oblong, ·12–·14 in. long, often much shorter in cultivated plants; lemma ·25–·3 in. long, regularly punctate, hispidulous, with a slender barbellate awn 1·4–5 in. long in wild plants, awnless in cultivated ones. Culms up to 4 ft. high; leaves 4–22 in. long, ·1–·35 in. wide ....1. *sativa.*

Panicles simple, 1·5–4 in. long, spikelets few; lower glume 0 or minute, upper ·04–·06 in. long; lemma ·22–·24 in. long, densely irregularly granulate, glabrous. Culms rather slender, up to 3 ft. high; leaves 3–10·5 in. long, ·3–·9 in. wide ....2. *Meyeriana.*

Lemmas ·45–·5 in. long, excluding a stiff, glabrous arista ·13–·17 in. long, keel broadly winged above the middle, smooth, glabrous. Culms up to 6 ft. high; leaves 6–20 in. long, ·25–·5 in. wide; sheaths tessellate; panicles spiciform, 4–8 in. long; glumes finely subulate, ·16–·21 in. long ....3. *coarctata.*

1. Oryza sativa, Linn.; F. B. I. vii. 92.

In all Districts; in marshes; sea-level to 2,000 ft. Much cultivated in all Districts in wet fields for its edible grain and its straw.

The Paddy or Rice plant.

There are numerous races of the cultivated form. Vern. *Hind.* Dhan; *Ur.* Dhanno; *Tel.* Vadlu; *Tam.* and *Mal.* Nellu; *Kan.* Batta.

2. ORYZA MEYERIANA, Baill. *O. granulata*, Nees et Arn.; F. B. I. vii. 93.
   In most Districts; up to 4,000 ft.

3. ORYZA COARCTATA, Roxb.; F. B. I. vii. 93.
   Godavari District at Tallurevu (Barber).

109. Leersia, Sw.

Slender, perennial herbs. *Leaves* narrow, flat. *Panicle* contracted, usually flaccid. *Spikelets* imbricate, laterally compressed, 1-flowered. *Glumes* 0 or reduced to an obscure, hyaline, entire or 2-lobed rim. *Lemma* coriaceous or chartaceous, oblong, strongly 1-keeled; palea similar in texture and shape, nearly as long but narrower, 1-keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* usually 6, sometimes 3 or fewer. *Styles* 2, free. *Grain* oblong, compressed, free within the lemma and palea.

LEERSIA HEXANDRA, Sw.; F. B. I. vii. 94; S. I. G. fig. 119.
In all Districts; in marshes and lakes; sea-level to 7,000 ft. Culms up to 4 ft. high; leaves usually stiff, 3–8 in. long, ·1–·4 in. wide; panicles 2–5 in. long; lemma obliquely oblong, ·13–·15 in. long, keels of lemma and palea bristle-ciliate.
Much liked by cattle. Vern. *Hind.* Jungli dhan; *Mal.* Nir valli pullu; *Kan.* Kadu bili sajjabu hullu.

110. Hygrorhiza, Nees.

Glabrous floating herbs; culms spongy below, emitting capillary roots at the nodes. *Panicles* short, broad. *Spikelets* narrowly lanceolate, 1-flowered, articulate on their pedicels but tardily deciduous. *Glumes* 0. *Lemma* thinly chartaceous, narrowed into an awn; palea similar but narrower, awnless, containing a bisexual floret. *Lodicules* 2, gibbous. *Stamens* 6; anthers long, slender. *Styles* 2, free. *Grain* narrowly oblong, free within the lemma and palea.

HYGRORHIZA ARISTATA, Nees; F. B. I. vii. 95; S. I. G. fig. 120.

Along both coasts; Mysore State at Kumsi (Meebold) at 2,000 ft.

Floating culms a foot or more long, erect branches 2–8 in. high; leaves subcoriaceous, ovate to narrowly ovate-oblong, base subcordate, 1–3·1 in. long, ·2–·7 in. wide; panicles 1–2 in. long; spikelets few, long-pedicelled; lemma narrowly lanceolate, ·23–·3 in. long, strongly 5-nerved; awn ·25–·55 in. long, scabrid.

The grain is eaten by the poor. Readily eaten by cattle. Vern. *Tam.* Valli pullu.

111. Anthoxanthum, Linn.

Perennial, erect, usually sweet-scented herbs. *Leaves* flat. *Panicles* spiciform or more or less branched and somewhat lax. *Spikelets* pedicelled, slightly laterally compressed, 3-flowered; rhachilla disarticulating above the glumes. *Glumes* 2, persistent, membranous, sometimes chaffy and shining, complicate, sharply keeled; the upper the longer and with a strong rib on each side close to the keel. *Lemmas* 3: the 2 lower similar and subequal, laterally compressed, 1-keeled, hairy, 2-lobed or -fid, sometimes the upper to near the base, the lowest bearing an arista from $\frac{1}{3}$–$\frac{1}{2}$ way below the tip, usually slightly overtopping it, but sometimes shorter, the second with a geniculate awn from the back; the uppermost lemma shorter, usually complicate and 1-keeled, glabrous. *Paleas* of the 2 lower lemmas, if present, narrow, 2-keeled, empty or containing a ♂, usually 3-stamened floret; the uppermost palea complicate, 1-keeled, enclosing a bisexual floret, usually with 2 stamens. *Lodicules* 0. *Styles* 2. *Grain* elliptic-ovoid, slightly laterally compressed; embryo $\frac{1}{4}$ as long.

ANTHOXANTHUM HOOKERI, Rendle. *Hierochloa Hookeri*, C. B. Clarke ex Hook. f.; F. B. I. vii. 223.

Pulney Hills in the vicinity of Kodaikanal; 6,000–7,000 ft. Possibly an escape from gardens, but I have seen no specimen from a garden.

Rootstock creeping; culms 20–40 in. high; leaves 4–11 in. long, ·2–·4 in. wide, closely ribbed as are also the sheaths; panicles lax; upper glume ·23–·27 in. long; 2 lower lemmas

·18–·22 in. long, brown-hairy; awn ·28–·4 in. long; uppermost lemma ·1–·12 in. long, rarely emarginate with a short arista.

Anthoxanthum odoratum, Linn.; F. B. I. vii. 222. The sweet vernal grass is cultivated in gardens in the hills. It differs from the above species through its smaller size; leaves mostly basal; panicles spiciform, short and close; 2 lower lemmas ·12–·15 in. long, devoid of paleas and empty; uppermost lemma ·06–·08 in. long.

112. **Lophatherum**, Brogn.

Perennial, leafy herbs. *Leaves* petioled, flat, narrowly lanceolate, tessellate with transverse nerves. *Panicles* subsimple, lax, narrow; branches alternate. *Spikelets* solitary, secund, narrowly lanceolate, terete, 1-flowered, jointed at the base; rhachilla not jointed, produced beyond the floret and bearing several closely-sheathing, cuspidate, empty lemmas. *Glumes* 2, membranous, the upper the longer, rounded on the back or the lower 1-keeled, 5–7-nerved, acute or obtuse, margins often hyaline. Lowest *lemma* longer, 7–9-nerved, mucronate or cuspidate; palea narrow, 2-keeled, keels narrowly winged, containing a bisexual floret. *Lodicules* 2–3. *Stamens* 3. *Styles* 2, connate at the base. *Grain* oblong and compressed or fusiform and terete, free within the lemma and palea; embryo long.

LOPHATHERUM GRACILE, Brogn.; F. B. I. vii. 331.

Travancore without specific locality (Venkoba Rao).

Culms 2–5 ft. high; leaves 4–10 in. long, 1–1·5 in. wide; panicles 6–18 in. long, branches few; spikelets ·33–·5 in. long, terminated by the erect or spreading cusps of the empty lemmas.

113. **Centotheca**, Desv.

Perennial, leafy herbs. *Leaves* rather broad, with transverse veins. *Panicles* subsimple, lax; branches long, slender, spiciform; pedicels capillary. *Spikelets* secund, alternate, laterally compressed, all perfect or the 1–several upper empty, perfect ones 1–3-flowered, not articulated at the base; rhachilla very slender, articulated at the base and between the lemmas, rarely produced

above the uppermost. *Glumes* 2, persistent unequal, distant at the insertions, ovate-oblong, 3- or 5-nerved. *Lemmas* ovate to oblong, obtuse or acute, rounded on the back, 5- or 7-nerved, the upper ones usually bearing soft, erect, ultimately deflexed, tubercle-based bristles; paleas narrow, 2-keeled, keels ciliolate, containing each a bisexual floret. *Lodicules* 0. *Stamens* 2–3, *Styles* 2, free. *Grain* ovoid, acute, terete, free within the lemma and palea.

CENTOTHECA LAPPACEA, Desv.; F. B. I. vii. 332.

In most Districts, more abundant in wet localities; up to 3,000 ft.

Culms stout, 1–5 ft. high; leaves narrowly lanceolate to ovate, 2–10 in. long, ·45–1·4 in. wide; panicles 3·5–14 in. long; glumes ·09–·14 in. long, the upper the longer; lowest lemma ·16–·2 in. long.

114. Melica, Linn.

Perennial, erect herbs. *Leaves* narrow, flat or convolute. *Panicles* open, spiciform or reduced almost to a raceme, often secund. *Spikelets* few to many, laterally compressed or subterete, 1–5-flowered, jointed on the pedicels or not; rhachilla disarticulating tardily at the base, readily between the flowering lemmas. *Glumes* 2, membranous, scarious or hyaline, persistent or falling separately, equal or unequal, 3- or 5-nerved or the upper 7-nerved. *Lemmas* firmly membranous, the margins and tips often hyaline, 5–9-nerved; paleas 2-keeled, the lower 1–3, rarely 4–5, containing each a bisexual floret, the several above smaller, empty, embracing each other to form a clavate or oblong terminal body. *Lodicules* 2, connate. *Stamens* 3. *Styles* 2, free. *Grain* oblong or subcylindric, terete or semi-terete; embryo small.

MELICA SCABERRIMA, Hook. f.; F. B. I. vii. 330.

Introduced and escaped from gardens around Ootacamund (Gamble); 7,000 ft.

Culms 1–3 ft. high; leaves 2–3·5 in. long, ·1–·15 in. wide; panicles often effuse and large; perfect florets usually 2 or 3, sometimes up to 5; glumes ovate-lanceolate or the upper elongate-lanceolate, lower ·18–·2 in. long, 1-nerved, upper ·21–·25 in. long, 3-nerved; lemmas ·21–·28 in. long, minutely scaberulous.

115. Briza, Linn.

Annual or perennial, erect herbs. *Leaves* flat or convolute. *Panicles* effuse, sometimes reduced to a raceme; branches and pedicels capillary. *Spikelets* pendulous, laterally compressed, few–many-flowered; rhachilla disarticulating above the glumes and between the lemmas. *Glumes* 2, scarious or firmly membranous, boat-shaped and keeled or saccate and rounded on the back, persistent, subequal, 3–9-nerved. *Lemmas* firmly membranous with scarious margins, shaped more or less like the glumes, obtuse, acute or subaristate, 7–9-nerved, the outer 3 or all the lateral nerves palmately spreading; paleas much shorter, broad, 2 keeled, keels often winged, each containing a bisexual floret or the upper reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* ovoid, concavo- or plano-convex, usually dorsally compressed; embryo small.

Spikelets ovate, few, sometimes only 1 or 2, ·4–·9 in. long, straw-coloured to brown or purplish, 7–20-flowered. Culms 5–26 in. high; leaves 2–8 in. long, ·2–·3 in. wide; glumes very broadly ovate, ·2–·3 in. long; lemmas very broadly ovate-cordate, ·3 in. long, the upper at least silky-hairy ....1. *maxima.*

Spikelets numerous, triangular to ovate, often wider than long, ·12–·15 in. long, green, rarely purplish, 4–9-flowered. Culms 2–15 in. high; leaves 1·5–5 in. long, ·12–·32 in. wide; panicles broadly obovate, lax, 1·5–3·5 in. long; glumes ·08–·1 in. long, horizontally spreading; lemmas broadly ovate-cordate, very gibbous below, the scarious margins very broad, ·08–·1 in. long, glabrous......2. *minor.*

1. BRIZA MAXIMA, Linn.; F. B. I. vii. 336.
   Introduced and run wild about the Nilgiri and Pulney Hill Stations and in Travancore; 7,000–8,000 ft. The Large Quaker- or Quaking-grass.

2. BRIZA MINOR, Linn.; F. B. I. vii. 336.
   Introduced and run wild around Ootacamund and Kodaikanal; 6,000–7,000 ft. The Small Quaker- or Quaking-grass.

116. Poa, Linn.

Annual or perennial, usually small herbs. *Leaves* flat or convolute. *Panicles* lax or contracted, rarely spiciform. *Spikelets* laterally compressed, 2–6-flowered, not jointed at the base;

rhachilla jointed at the base and between the lemmas. *Glumes* 2, thinly membranous, subequal, acute or obtuse, 1-keeled, 1–3-nerved. *Lemmas* membranous, acute or obtuse, 5–7-nerved; paleas shorter, 2-keeled, each containing a bisexual floret or the uppermost reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* ovoid, oblong or linear, often grooved, free within the lemma and palea or adhering to the latter; embryo small.

Lemmas connected by long, often copious silky wool; ·12–·16 in. long; rhachilla long-silky-woolly. Culms 1–2 ft. high; leaves 2·5–8 in. long, very narrow, panicles 2–2·5 in. long; glumes acute, lower ·08–·11 in. long, upper ·1–·15 in. long .... 1. *trivialis.*

Lemmas not connected by wool, ·12 in. long; rhachilla glabrous. Culms tufted, 2–12 in. high; leaves 1–4·5 in. long, ·1–·12 in. wide; panicles 1–2·5 in. long; glumes obtuse, lower ·06 in. long, upper ·08 in. long .... 2. *annua.*

1. Poa trivialis, Linn.
Introduced and escaped around Ootacamund and in the Pulney Hills; 5,000–7,000 ft. The Rough Meadow-grass.

2. Poa annua, Linn.; F. B. I. vii. 345.
Probably introduced and escaped around the Hill Stations of the Nilgiri and Pulney Hills; 4,000–7,200 ft. The Annual Meadow-grass.

117. Glyceria, R. Brown

Perennial, rarely annual herbs. *Leaves* flat or convolute. *Panicles* effuse or contracted. *Spikelets* laterally compressed, few- to many-flowered, not jointed at the base; rhachilla jointed between the lemmas. *Glumes* 2, thin, unequal, persistent, 1–5-nerved. *Lemmas* membranous with a broadly hyaline tip, broadly oblong, obovate or fan-shaped, rounded or truncate, rarely subacute, back rounded, 3–9-nerved; paleas 2-keeled, all but the empty uppermost enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* terete or compressed, free between the lemma and palea or sub-adherent to the latter.

Glyceria fluitans, R. Br.; F. B. I. vii. 347.
Introduced and escaped about Ootacamund; 7,000–7,500 ft.; usually in wet situations. The Floating Meadow-grass.

Culms 1–3 ft. high, lax; leaves flaccid, 2·5–11 in. long, ·15–·35 in. wide; panicles narrow, 4–12 in. long, branches rather distant; perfect florets 7–12; glumes broadly oblong, lower ·08–·09 in. long, upper ·13–·14 in. long; lemmas broadly oblong, the lowest ·18–·22 in. long; paleas 2-toothed, keels narrowly winged upwards.

118. Dactylis, Linn.

Stiff, erect, perennial herbs. *Leaves* flat. *Panicles* terminal, unilateral, composed of short, crowded, unilateral spikes. *Spikelets* subdistichous, compressed, not jointed at the base, 3–10-flowered; rhachillas continuous. *Glumes* scarious, persistent, unequal, lanceolate, acuminate, mucronate or caudate; lower 1-nerved; upper 3-nerved. *Lemmas* rather longer, rigid, subaristate, keel scabrid, 5-nerved; paleas 2-fid, 2-keeled, keels ciliolate, each enclosing a bisexual floret, or the uppermost reduced or empty. *Lodicules* 2, fleshy, 2-lobed. *Stamens* 3. *Styles* 2, free. *Grain* oblong, acute, trigonous, dorsally subcompressed, ventrally channelled.

DACTYLIS GLOMERATA, Linn.; F. B. I. vii. 335.

Introduced and run wild in and about Ootacamund; 7,000–8,000 ft. The Cock's-foot grass.

Culms 1–3 ft. high, erect from a short, creeping rootstock; leaves 3–18 in. long, ·1–·3 in. wide; panicles 1·5–5 in. long; lower glume ·15–·2 in. long, upper ·25 in. long; lemmas 3–4, lowest ·26–·3 in. long.

119. Vulpia, Gmelin

Annual, slender, erect herbs. *Leaves* very narrow, involute or convolute. *Panicles* contracted, narrow, usually more or less secund; pedicels clavate. *Spikelets* laterally compressed after flowering, 1–7-flowered; rhachilla slender, disarticulating at the base and between the fertile lemmas. *Glumes* very unequal; the lower minute or obsolete or like the upper subulate to subulate-lanceolate but much shorter, 1-nerved; the upper usually 3-nerved. *Lemmas* subulate-lanceolate, tapering into a straight awn, back rounded, faintly 5-nerved; paleas entire or minutely 2-toothed, 2-keeled, 1–several lower containing each a bisexual floret, the 1 or

2 uppermost reduced. *Lodicules* 2, hyaline. *Stamens* 1–3. *Styles* 2, free. *Grain* linear, back strongly compressed, concave in front, enclosed within the lemma and palea, adhering to the latter or to both; embryo small.

VULPIA MYUROS, Gmel. *Festuca Myuros*, Linn.; F. B. I. vii. 356.
Introduced and escaped about Ootacamund and Kodaikanal; 6,500–8,000 ft. The Mouse-tail fescue-grass.
Culms 6–18 in. high; leaves setaceous, at least when dry, 1–10 in. long; panicles narrow, spiciform, erect or nodding, 2–10 in. long; lower glume ·02–·07 in. long, upper ·16–·2 in. long, acuminate; lemmas 3–5 perfect, 1–2 reduced, lowest ·23–·34 in. long, its awn ·46–·7 in. long.

120. Festuca, Linn.

Perennial, tufted herbs. *Leaves* flat, folded or convolute, often setaceous; sheaths more or less open, seldom closed. *Panicles* more or less compound, contracted or open, sometimes effuse. *Spikelets* laterally compressed (at least after flowering), 2–many-flowered; rhachilla disarticulating at the base and between the lemmas. *Glumes* subequal, rarely conspicuously unequal, more or less keeled, 1–3-nerved, the upper rarely 5-nerved. *Lemmas* lanceolate, muticous, mucronate or awned from the tip or very near it, back rounded or keeled towards the apex, 5–7-nerved; paleas more or less 2-toothed, 2-keeled, containing each a bisexual floret, the uppermost usually reduced. *Lodicules* 2, hyaline. *Stamens* 3. *Styles* 2, free. *Grain* oblong, back convex, grooved or concave in front, tightly enclosed in the slightly hardened lemma and palea, free or more or less adhering to the palea or to both; embryo small.

FESTUCA OVINA, Linn.
Introduced and escaped about Ootacamund; 7,000–8,000 ft. Sheep's fescue-grass.
Culms wiry, 6–15 in. high; leaves convolute and more or less setaceous, 1·3–3 in. long (much longer in the viviparous form); panicles open, 1–3 in. long; glumes ·1–·18 in. long, the upper about $\frac{1}{3}$ longer than the lower; lemmas lanceolate, ·22–·25 in. long, 4–7 with perfect florets.

121. Bromus, Linn.

Annual or perennial herbs. *Leaves* narrow, flat. *Panicles* contracted and often dense or open and sometimes effuse or reduced to a raceme. *Spikelets* laterally compressed (at least after flowering), rather large, erect or pendulous, not jointed at the base, usually many-flowered; rhachilla disarticulating at the base and between the lemmas. *Glumes* usually unequal, persistent, acute to acuminate; the lower 1–7-nerved; the upper 3–9-nerved. *Lemmas* lanceolate to broadly oblong, back rounded or keeled, 5–13-nerved, usually awned, sometimes 3-awned, median or only awn erect or recurved, sometimes twisted at the base, not kneed; paleas entire or 2-fid, keels 2, scabrid or ciliate, enclosing each a bisexual floret, the uppermost reduced. *Lodicules* 2. *Stamens* 3, rarely 2. *Ovary* obovoid with a villous 2- or 3-lobed appendage. *Styles* 2, lateral on the appendage. *Grain* linear to linear-oblong, usually concavo-convex, enclosed in and usually adhering to the lemma and palea or at least to the latter; embryo small.

Perennial; culms up to 6 ft. high; leaves 4–18 in. long, ·12–·5 in. wide, glabrous or more or less hairy; panicles up to 1 ft. long; lower glume 1-nerved, ·12–·34 in. long, upper 3-nerved, ·18–·43 in. long; lemmas 3–9, ·28–·5 in. long, 5–7-nerved, aristate, scaberulous, keeled below the tip .... 1. *asper.*

Annual; culms up to 28 in. high; leaves 5–15 in. long, ·1–·3 in. wide, glabrous; panicles narrow, usually nodding, 3–16 in. long; spikelets strongly compressed; glumes keeled, lower 5–7-nerved, ·44–·58 in. long, upper 7–9-nerved, ·49–·7 in. long; lemmas 4–10, ·5–·7 in. long, 9–13-nerved, cuspidate, keeled .... 2. *catharticus.*

1. Bromus asper, Murray; F. B. I. vii. 358.
   Nilgiri and Pulney Hills; 5,500–8,000 ft.
   Doubtfully indigenous.

2. Bromus catharticus, Vahl. *B. unioloides*, H. B. K.; F. B. I. vii. 357.
   Nilgiri Hills; 6,500–8,000 ft.
   An introduced American grass escaped about Ootacamund and Kotagiri; sometimes grown for fodder.
   Flowers cleistogamous.

122. Streptogyna, Beauv.

Tall, erect, perennial herbs. *Leaves* petioled, flat, with obscure transverse venules. *Spikes* erect, unilateral. *Spikelets* long, narrow, subterete, imbricate, 1–6-flowered, not jointed at the base; rhachilla very long, slender, articulated at the base and between the lemmas. *Glumes* chartaceous, persistent; the lower oblong, tip truncate and erose, 3–7-nerved to the tip; the upper much longer, acuminate, tip entire or 2-toothed, awned. *Lemmas* chartaceous, very narrow, convolute, tip acutely 2-fid and awned from the sinus, 3-nerved; paleas as long, keels 2, close, smooth, each enclosing a bisexual floret. *Lodicules* 3, elongate. *Stamens* 2–3. *Style* single, long, twisted, with 2–3 long, tortuous stigmas. *Grain* linear, free but closely embraced by the lemma and palea.

STREPTOGYNA GERONTOGEA, Hook. f. *S. crinata*, Thw. non Beauv.; F. B. I. vii. 333.

S. Travancore; in moist forest.

Culms 2–6 ft. high; leaves 6–12 in. long, ·4–1 in. wide; spikes 4–16 in. long; lower glumes ·3–·14 in. long, upper 2½–3 times longer; lowest lemma a little longer than the upper glume, its awn ·6–1 in. long.

123. Brachypodium, Beauv.

Annual or perennial herbs. *Leaves* flat or setaceously convolute. *Racemes* terminal, simple, spiciform; joints of axis more or less hollowed, at least the lower, opposite the spikelets. *Spikelets* often few, rarely solitary, at first cylindric, later laterally compressed, erect and appressed to the rhachis or spreading, 5–many-flowered; rhachilla disarticulating above the glumes and between the lemmas. *Glumes* 2, persistent, firm, more or less unequal, 3–7-nerved. *Lemmas* oblong to oblong-lanceolate, usually narrowed into a mucro or a straight arista, back rounded, 7–9-nerved, at first imbricate, then spreading; paleas rather broad, obtuse or truncate, 2 keeled, keels rigidly ciliate, each enclosing a bisexual floret, the uppermost more or less reduced. *Lodicules* 2, ciliate. *Stamens* 2 or 3. *Ovary* crowned with a villous appendage. *Styles* 2, lateral. *Grain* linear or linear-oblong, concavo-convex, enclosed in the lemma and palea, more or less adherent to the latter; embryo small.

BRACHYPODIUM SYLVATICUM, Beauv.; F. B. I. vii. 362.

About the hill-stations in the Nilgiris and around Kodaikanal; 5,000–7,000 ft. Probably introduced and escaped.

Culms up to 4 ft. high; leaves 3–8 in. long, ·1–·3 in. wide, flat and flaccid or convolute; racemes 2–8 in long; lower glume ·16–·18 in. long, 3-nerved, upper ·26–·27 in. long, 5–7-nerved; lemmas 8–14, ·29–·36 in. long, 7–9-nerved, mucro or arista ·04–·32 in. long.

124. Lolium, Linn.

Annual or perennial, erect herbs. *Leaves* flat or convolute. *Spikes* terminal, simple, solitary; rhachis alternately and distichously hollowed opposite the spikelets. *Spikelets* solitary, 2-ranked, usually more or less compressed, the lowest lemma appressed to the rhachis, 3–11-, sometimes more-flowered. *Glumes* 2 in the terminal spikelet, equal and similar, in all the other spikelets the lower glume suppressed; upper linear to oblong, persistent, rigid, many-nerved. *Lemmas* shorter, oblong, obtuse, acute or awned, back rounded, 5–many-nerved; paleas as long, 2-keeled, keels sometimes narrowly winged, each containing a bisexual floret or the uppermost reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic- to linear-oblong, tightly enclosed by and adhering to the lemma and palea; embryo short.

LOLIUM PERENNE, Linn.; F. B. I. vii. 365.

Introduced and escaped around Ootacamund and in the Pulney Hills. The Rye grass.

Perennial; culms up to 18 in. high; leaves 3–12 in. long, ·05–·15 in. wide, flat or convolute; spikes 3–9 in. long; glumes ·34–·4 in. long; lemmas 3–11, ·24–·28 in. long.

125. Triticum, Linn.

Annual or biennial herbs. *Leaves* flat. *Spikes* terminal, solitary; rhachis excavated opposite the spikelets, articulate or inarticulate. *Spikelets* solitary, distichous, tumid, few-flowered. *Glumes* 2, persistent, rigid, often unequal-sided, obtuse or shortly awned. *Lemmas* oblong or ventricose, back rounded or keeled upwards, muticous or 1–3-awned, 5–9-nerved; paleas as long, 2-keeled, keels ciliate, the lower each containing a bisexual floret, the upper

enclosing a ♂ floret or empty. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* oblong, ventrally grooved, often hairy, free within the lemma and palea or adhering to the latter.

TRITICUM DICOCCUM, Schrank. *T. vulgare*, Vill.; F. B. I. vii. 367.
Cultivated here and there for its grain, but not extensively. The Wheat or Corn plant. Vern. *Tel.* Godumalu; *Tam.* Godumai; *Mal.* Kotampam; *Kan.* Godi.

126. **Hordeum,** Linn.

Annual or perennial herbs. *Leaves* flat. *Spikes* terminal, solitary, simple, cylindric; rhachis excavate or jointed. *Spikelets* 2–3-nate in the hollows or at the nodes of the rhachis, 1-flowered or the lateral imperfect; rhachilla jointed below the lemma and produced above it as a bristle, sometimes bearing an abortive lemma. *Glumes* 2, persistent, rigid, narrow, the outer ones of each cluster together often resembling an involucre. *Lemmas* lanceolate, tapering into a long straight or recurved awn, back rounded, 5-nerved; paleas about as long, 2-keeled, deeply folded between the keels, containing a bisexual floret, or in the lateral spikelets a ♂ floret or empty and much reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* ovoid- or narrow-oblong, grooved in front, tip usually villous, tightly enclosed in the lemma and palea and adhering to the latter or to both; embryo small.

HORDEUM HEXASTICHON, Linn. *H. vulgare*, Linn. var. *hexastichon*, Aitchis.; F. B. I. vii. 371.
Occasionally cultivated in the hills. The Barley plant. Vern. *Tam.* Ganji, Dorai ganji.

127. **Arundinaria,** Michaux

Erect or climbing woody shrubs. *Culms* slender; nodes usually prominent. *Culm-sheaths* thin, papery, straw-coloured; imperfect blades narrow, subulate. *Leaves* usually small. *Inflorescence* various, paniculate or racemose. *Spikelets* often long, compressed, often enclosed in bracteate sheaths, 1–many-flowered. *Glumes* 2, membranous, unequal. *Lemmas* longer, concave, many-nerved, obtuse, acute or mucronate; paleas usually shorter, prominently 2-keeled, usually compressed, all containing a bisexual floret, except

sometimes the reduced terminal. *Lodicules* 3, ovate or lanceolate, ciliate. *Stamens* 3, rarely up to 6, usually exserted, anthers usually blunt. *Ovary* globular above, often hairy. *Style* short; stigmas 2–3. *Grain* ovate or narrowly oblong, smooth, furrowed on the back, enclosed in the persistent lemma and palea.

Large shrubs; culm-leaves over 4 in. long, distinctly, shortly petioled; spikelets many in large terminal panicles 3–5-flowered:—

Leaves thick with thickened cartilaginous margins, base nearly truncate, 5–11 in. long, 1–1·7 in. wide .... 1. *Walkeriana.*

Leaves thin, margins neither thickened nor conspicuously cartilaginous, base usually shortly narrowed, 4–7 in. long, ·7–1 in. wide 2. *Wightiana.*

Small shrubs up to 3 ft. high; leaves densely imbricate, thick, rigid, pungent, margins thickened, cartilaginous, sessile or nearly so, ·8–1·5 in. long, ·17–·3 in. wide; spikelets in racemes on leafy branches. 1-flowered .... 3. *densifolia.*

1. Arundinaria Walkeriana, Munro; F. B. I. vii. 377; Gamble Ann. Calc. vii. t. 1.

Pulney Hills (Beddome).

2. Arundinaria Wightiana, Nees; F. B. I. vii. 377; Gamble Ann. Calc. vii. t. 2.

Nilgiri, Palghat, Pulney and High Wavy Mountains (Blatter and Hallberg); 3,000–8,000 ft.

Common underwood in the Nilgiri Sholas. Flowering annually; densely gregarious.

Var. *hispida*, Gamble; F. B. I. vii. 377.

Leaf-sheaths and stems thickly covered with golden hairs from tubercles; internodes more flattened on one side.

Nilgiri Hills; 7,000–7,500 ft.

3. Arundinaria densifolia, Munro; F. B. I. vii. 379; Gamble Ann. Calc. vii. t. 7.

Anaimudi in Travancore at 8,500 ft. (Beddome).

Densely gregarious.

128. Dendrocalamus, Nees

Trees, sometimes large, always unarmed. *Culms* usually erect from a densely branched rootstock, sometimes nearly solid. *Culm-sheaths* often very large, usually elongate, variably auricled;

imperfect blades narrowly triangular. *Leaves* sometimes very broad, without transverse veins but frequently with pellucid glands instead. *Panicles* large, compound; the spikelets usually in globose congested heads in long spikes. *Spikelets* ovate, florets few, rarely more than 6, usually bisexual. *Glumes* 2–3, ovate, acute or mucronate, many-nerved. *Lemmas* similar; paleas ovate, acute, truncate, emarginate or 2-cleft, the lower 2-keeled and ciliate, the uppermost usually rounded on the back and eciliate. *Lodicules* usually 0. *Stamens* 6; filaments free; anthers mucronate or with tufted hairs. *Ovary* ovoid or subglobose, often depressed, hairy above. *Style* long, usually hairy; stigma usually simple. *Grain* small; pericarp crustaceous or hardened.

DENDROCALAMUS STRICTUS, Nees; F. B. I. vii. 404; Bedd. Fl. Sylv. t. 325; Gamble Ann. Calc. vii. tt. 68, 69. *Bambos stricta*, Roxb. Cor. Pl. t. 80.

Gregarious in all the drier hill-tracts; 300–4,800 ft.; absent from the W. Coast. The Male Bamboo.

Variable in size according to climate; culms 20–50 ft. high, 1–3 in. diam., sometimes solid; leaves in very dry localities 1–2 in. long, in moist ones up to 10 in. long, ·2–1·2 in. wide; spikelets in dense globose heads ·3–1·3 in. diam., spinescent, usually hairy, the fertile intermixed with smaller barren ones; lemmas ending in a short, sharp spine surrounded by ciliate tufts of hairs.

The culms are much used for poles, rafters, lance-shafts, lathies, matting, baskets, etc. Vern. *Hind.* Bans; *Ur.* Salia bhanso, Salimbo bhanso; *Tel.* Sadanapa veduru, Pen veduru, Kanka; *Tam.* and *Mal.* Kal mungil.

129. Bambusa, Schreber

Shrubs or trees, rarely climbing, often very large, sometimes thorny. *Culms* from a thick rhizome, sometimes stoloniferous. *Culm-sheaths* usually broad, as also the triangular imperfect blades. *Leaves* small to moderately large, their sheaths variously auriculate. *Inflorescence* usually a large, leafless, compound panicle with the spikelets in heads on spicate branchlets, but sometimes in leafy panicles or paniculate spikes. *Spikelets* 1–many-flowered. *Glumes*

1–3. *Lemmas* ovate-lanceolate, usually mucronate; paleas 2-keeled containing a bisexual floret. *Lodicules* 3, membranous, generally obtuse, ciliate. *Stamens* 6; filaments free, often exserted; anthers narrow, tip obtuse, apiculate or panicillate. *Ovary* oblong or obovate, hairy at the apex. *Style* short or long; stigmas 1–3. *Grain* oblong or linear-oblong, furrowed on one side; pericarp thin, adhering; embryo conspicuous.

Thornless; culms 20–70 ft. high, 2–4 in. diam.; blade of culm-sheath sparingly hairy within; leaves 6–10 in. long, ·7–1·5 in. wide; spikelets 1–3 in. long; lemmas ·5–1 in. long; ovary hairy ....1. *Tulda.*

Branches armed at the nodes with 2–3 recurved spines; culms 80–100 ft. high, 4–7 in. diam.; blade of culm-sheath densely felted with black or dark-purplish hairs within; leaves up to 8 in. long and 1 in. wide; spikelets ·5–1 in. long; lemmas ·2–·35 in. long; ovary glabrous ....2. *arundinacea.*

1. BAMBUSA TULDA, Roxb.; F. B. I. vii. 387; Gamble Ann. Calc. vii. t. 29.

   Vizagapatam District (Gamble); 1,500–2,000 ft.; Nundydroog (Rottler—perhaps cultivated).

   Used for building, scaffolding and the making of mats and baskets. Vern. *Hind.* Peka; *Beng.* Tulda, Talda bans.

2. BAMBUSA ARUNDINACEA, Willd.; F. B. I. vii. 395; Roxb. Cor. Pl. t. 79; Bedd. Fl. Sylv. t. 321; Gamble Ann. Calc. vii. t. 48.

   In all Districts; 100–4,000 ft. The Thorny Bamboo.

   Used for buildings, scaffolding and for many domestic purposes; for floating heavy timber; the split culms are woven into mats, baskets, fans, etc. The grain when available is eaten by the poor. Vern. *Ur.* Konta bhanso; *Tel.* Veduru, Mulla veduru, Bongudu; *Tam.* Mungil, Periya mungil, Peru varai mungil; *Mal.* Mulla, Illi; *Kan.* Dongi, Bidungalu, Hebbidru.

130. Teinostachyum, Munro

Shrubs or trees. *Culms* rather slender, drooping above. *Culm-sheaths* usually thin; imperfect blades recurved. *Leaves* usually lanceolate, acuminate. *Inflorescence* of spicate panicles on leafy

branches; the spikelets in bracteate verticels. *Spikelets* long, narrow, few–many-flowered, the upper and lower florets imperfect, the others bisexual. *Glumes* 1 or 2, ovate, mucronate. *Lemmas* similar with longer mucros; paleas convolute, 2-keeled, keels ciliate. *Lodicules* 3, conspicuous, 3–9-nerved, persistent. *Stamens* 6; filaments free; anthers exserted, obtuse or obtusely apiculate. *Ovary* ovate or depressed-globose, produced into a long beak enclosing the style; stigmas 2–3. *Grain* ovoid, acuminate, beaked; pericarp crustaceous, not adnate to the seed.

TEINOSTACHYUM BEDDOMEI, C. E. C. Fischer n. nom. *T. Wightii*, Bedd.; F. B. I. vii. 410; Bedd. Fl. Sylv. t. 323; Gamble Ann. Calc. vii. t. 87.

Nilgiri and Travancore Hills; 3,000–5,000 ft.

Culms semi-scandent, 10–20 ft. high, 1–1·5 in. diam.; ends of branches pendulous; culm-sheaths papery, 10–12 in. long; leaves oblong-lanceolate, 6–15 in. long, 1–2 in. wide; panicles large, terminal, drooping, branches spiciform; spikelets ·5–1 in. long; glume solitary; lemmas 3–4, 2–3 fertile, the others incomplete.

Flowers at long intervals and dies down.

Used by the jungle tribes for mats, baskets and fencing. Vern. *Tam.* Nanyura, Mai ita, Chittu.

131. Oxytenanthera, Munro

Scandent or small or medium-sized, unarmed, erect trees. *Culms* from a thick rhizome, usually creeping underground and stoloniferous. *Culm-sheaths* and imperfect blades usually narrow. *Leaves* usually small. *Inflorescence* a large panicle of spicate heads of few–many spikelets. *Spikelets* elongate, conical, 1–2–3-flowered, the uppermost usually fertile. *Glumes* 1–3. *Lemmas* elongate-ovate, mucronate; lower paleas 2-keeled, the uppermost convolute, only slightly or not at all keeled. *Lodicules* 0. *Stamens* 6; filaments united into a tube, thick at first, later membranous, exserted; anthers narrow, acute or apiculate. *Ovary* ovoid. *Style* fine; stigmas 1–3. *Grain* elongate, grooved, beaked by the persistent style; embryo conspicuous.

Glumes densely, often dark-ciliate, ·1–·16 in. long. Leaf-sheaths truncate and rigidly ciliate at the mouth. Spikelets ·44–·48 in. long; lemmas usually 4, densely ciliate above the middle; ·28–·46 in. long; grain ·25–·35 in. long .... 1. *nigrociliata* var. *Hohenackeri.*

Glumes not or sparingly pale-ciliate:—

Branches climbing, whip-like; culms hollow; culm- and sometimes leaf-sheaths with a separable, coriaceous, bristly ring at the mouth; spikelets ·35–·5 in. long, 1-flowered; glumes and lemmas usually sparingly pale-ciliate on the margins; style hairy ..2. *monadelpha.*

Branches not whip-like even though straggling; culm- and leaf-sheaths without bristly ring; spikelets ·6–1 in. long; glumes and lemmas eciliate:—

Culms solid or nearly so, densely velvety-tomentose; culm-sheaths thin, papery at the edges; leaf-sheaths without apical calluses; spikelets slender, long, spinose-apiculate, 1-flowered; style glabrous .... 3. *monostigma.*

Culms hollow, glabrous; leaf-sheaths with 2 apical calluses; spikelets robust, 3-flowered; style hairy .... 4. *Bourdilloni.*

1. Oxytenanthera nigrociliata, Munro; F. B. I. vii. 401.

Var. *Hohenackeri,* C. E. C. Fischer n. var.

Coorg near Mercara (Hohenacker); S. Kanara (Rhodes Morgan, G. F. F. Foulkes).

2. Oxytenanthera monadelpha, Alston. *O. Thwaitesii,* Munro; F. B. I. vii. 402; Bedd. Fl. Sylv. t. 322; Gamble Ann. Calc. vii. t. 64.

W. Ghâts from the Bababudan to the Travancore Hills; 3,500–6,000 ft.

Gregarious, subscandent, reed-like, 10–12 ft. high. Vern. Wattai (Anamallais—*Kadir* ?).

3. Oxytenanthera monostigma, Bedd.; F. B. I. vii. 462; Gamble Ann. Calc. vii. t. 65.

Coorg and Anamallai Hills.

Erect; culms up to 15 ft. high. Apparently rare.

4. Oxytenanthera Bourdilloni, Gamble; F. B. I. vii. 403; Gamble Ann. Calc. vii. t. 67.

Travancore, near the Cochin boundary; among precipitous rocks; 3,000–5,000 ft. (Bourdillon).

Straggling, forming open clumps; 20–30 ft. high. Vern. *Tam.* Kambu; *Kan.* Aramba.

132. Ochlandra, Thwaites

Reed-like woody shrubs or small trees. *Culms* erect, internodes rather long, thin-walled. *Culm-sheaths* thin, persistent. *Leaves* many-veined, margins cartilaginous; sheaths striate, fringed. *Inflorescence* of spikes or spicate panicles terminating leafy branches; spikelets verticelled, some fertile, some sterile. *Spikelets* 1-flowered, often very large. *Glumes* 2–5, variable, usually mucronate. *Lemmas* similar to the uppermost glume, mucronate; paleas membranous, not keeled. *Lodicules* 1–several, conspicuous, variable, usually appressed to the filaments. *Stamens* 6–120; filaments free or united into a tube, exserted; anthers long, usually mucronulate. *Ovary* narrow. *Style* long; stigmas 4–6. *Grain* large or very large, ovoid, long-beaked, supported by the persistent glumes; pericarp very thick, fleshy.

Ligules short:—

Culm leaves 1·7 in. or less wide; inflorescence, when known, of short terminal spikes or spicate panicles on leafy branches; spikelets 1·2 in. or less long; filaments free:—

Culm-sheaths truncate with 2 falcate, long-ciliate auricles, their imperfect blades long-ensiform; spikelets ·5–1·2 in. long, glabrous or with a few setae near the apex of glumes and lemmas. Culms erect, up to 16 ft. high and 1 in. diam.; leaves 4–10 in. long, ·4–1 in. wide; glumes ·24–·6 in. long; lemmas ·85 in. long 1. *scriptoria.*

Culm-sheaths, when known, attenuate into a needle-like blade; spikelets, when known, hirsute:—

Culms and culm-sheaths unknown. Leaves 5–8 in. long, 1–1·5 in. wide, mouth of sheaths with a rounded bristly auricle decurrent on either side; spikelets 1–1·5 in. long, covered with scattered, stiff, bulbous-based, spreading, brown hairs; glumes up to ·7 in. long; lemmas up to 1·3 in. long......2. *Beddomei.*

Culms erect or straggling, up to 20 ft. high, ·5–·7 in. diam.; culm-sheaths persistent, thin, papery, gradually narrowed to a narrow apex, their imperfect blades needle-like, ·7–1 in. long; leaves 4–9 in. long, ·6–1·7 in. wide. Inflorescence unknown 3. *setigera.*

Culm-leaves 6–18 in. long, 2–4·5 in. wide, mouth of their sheaths bearing stiff bristles; inflorescence a subverticillate, spicate panicle.

Culms erect, 6–20 ft. high, 1–2 in. diam.; spikelets 2–2·5 in. long; glumes up to 2 in. long, mucronate; lemmas 2–2·2 in. long, usually muticous; filaments united ....4. *travancorica.*

Ligules membranous, 1–1·8 in. long. Culms and culm-sheaths unknown; leaves 10–25 in. long, 1·5–4·5 in. wide, their sheaths rarely with a few deciduous bristles at the mouth; inflorescence a terminal verticillate spike with a thick rhachis; spikelets 1–1·7 in. long; glumes ·44–1·2 in. long with a cusp ·1–·25 in. long; lemmas 1·4–1·6 in. long, mucronate ....5. *Wightii.*

1. OCHLANDRA SCRIPTORIA, C. E. C. Fischer n. comb. *O. Rheedii,* Gamble: F. B. I. vii. 418; Gamble Ann. Calc. vii. t. 107.

   Malabar (Wight); Cochin (Johnston); Travancore; at low elevations. Growing in thick clumps on river banks.

   Flowers sporadically every year and does not die down.

   Used for mat and basket-making. Vern. *Mal.* Ammei, Ottal, Kolanji.

Var. *sivagiriana*, Gamble; F. B. I. vii. 419; Gamble Ann. Calc. vii. t. 108.

   Leaves and spikelets much larger; stamens more numerous, up to 60.

   Pulney (Beddome) and Sivagiri Hills.

2. OCHLANDRA BEDDOMEI, Gamble; F. B. I. vii. 419; Gamble Ann. Calc. vii. t. 110.

   Wynaad (Beddome).

3. OCHLANDRA SETIGERA, Gamble; F. B. I. vii. 420; Gamble Ann. Calc. vii. t. 115.

   Nilgiri Hills at Gudalur at 3,000 ft. (Gamble).

4. OCHLANDRA TRAVANCORICA, Gamble; F. B. I. vii. 419; Gamble Ann. Calc. vii. t. 111. *Beesha travancorica*, Bedd. Fl. Sylv. t. 324.

   Anamallai, Tinnevelly and Travancore Hills; sea-level to 5,000 ft.

   Gregarious in evergreen forest, covering large areas with a dense growth. Flowers at long intervals and dies down.

   In great demand locally for mat- and basket-making.

   A coarse paper is made from it. The leaves are much eaten by elephants and can be fed to horses if grass is scarce. Vern. *Tam.* Eeral, Eera-katti, Nanal, Odai; *Mal.* Eetta, Kar-eetta, Vei.

Var. *hirsuta*, Gamble; F. B. I. vii. 420; Gamble Ann. Calc. vii. t. 112.

Leaves thicker, margins more cartilaginous, their sheaths with appressed hairs from bulbous bases; spikelets thickly clothed with light-brown velvety pubescence.

Travancore Hills (Beddome).

5. Ochlandra Wightii, C. E. C. Fischer n. comb. *O. Brandisii*, Gamble; F. B. I. vii. 420; Gamble Ann. Calc. vii. t. 113.

Travancore; at low elevations and up to 3,500 ft.

Much resembling the previous species.